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DOE/EIA-0360(80)

1980 Active Solar Installations Survey

Energy Information Administration
Office of Coal, Nuclear, Electric and Alternate Fuels
U.S. Department of Energy

October 1982

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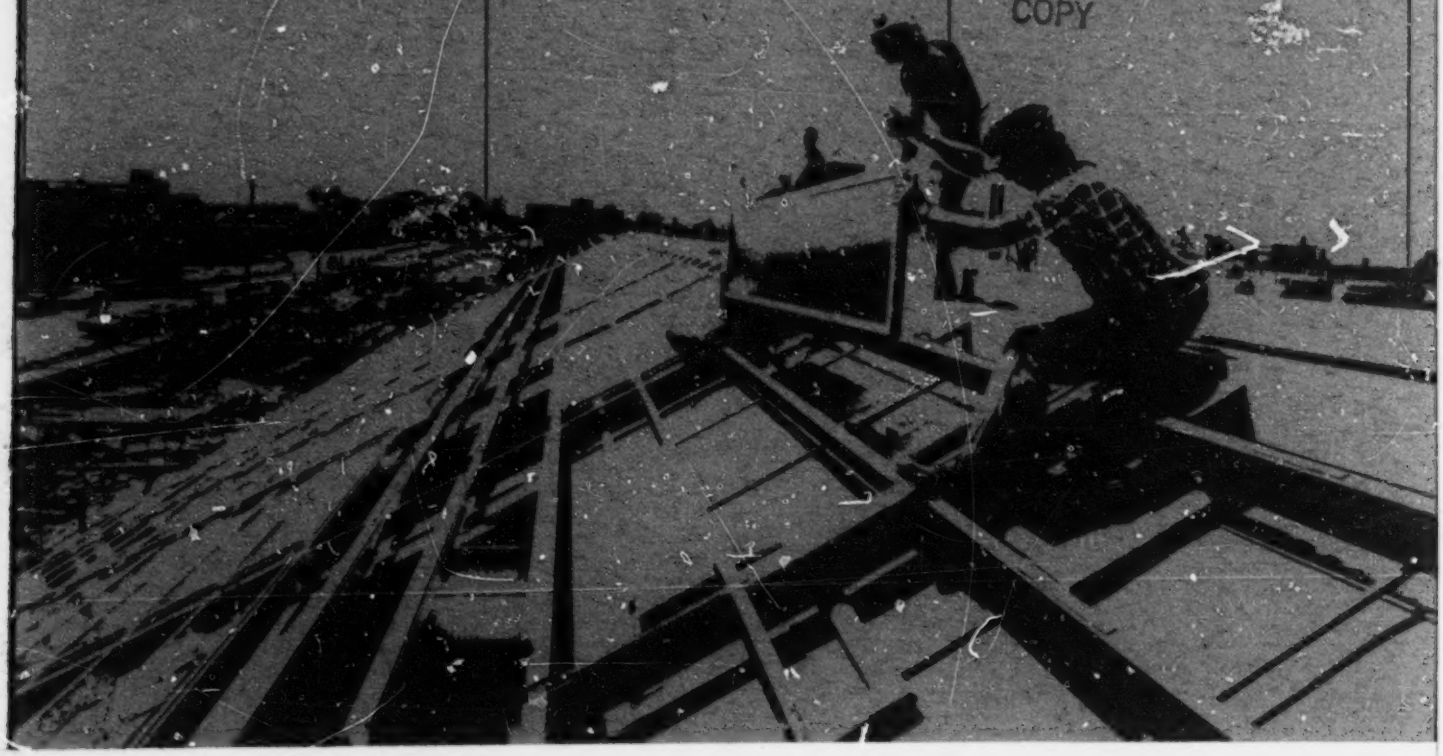

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Released for printing November 3, 1982.

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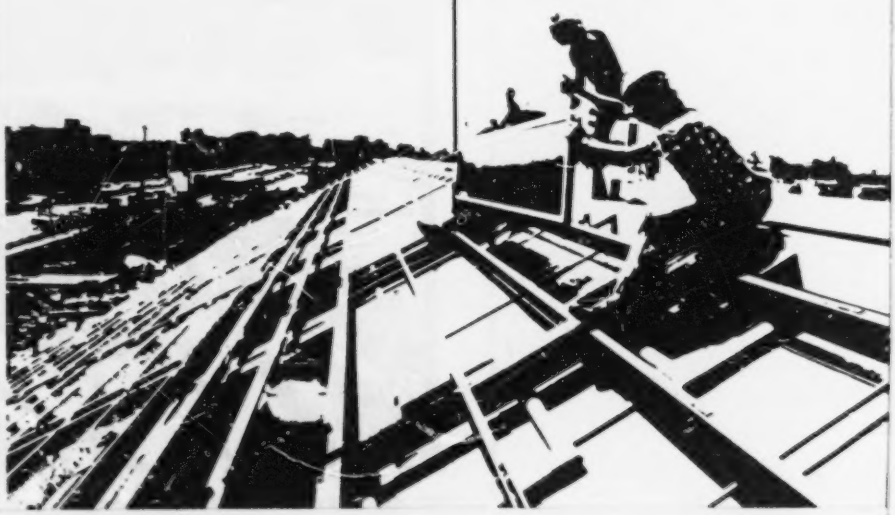

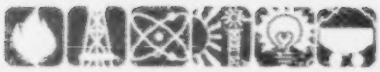

This report was prepared by Applied Management Sciences,
under contract to the Energy Information Administration,
Department of Energy (contract number DE-AC01-80EI-1023
Questions may arise concerning the contents of this repo
They may be directed to John Carlin, Nuclear and Alterna
Fuels Division, Office of Coal, Nuclear, Electric, and
Alternate Fuels, Energy Information Administration, (202
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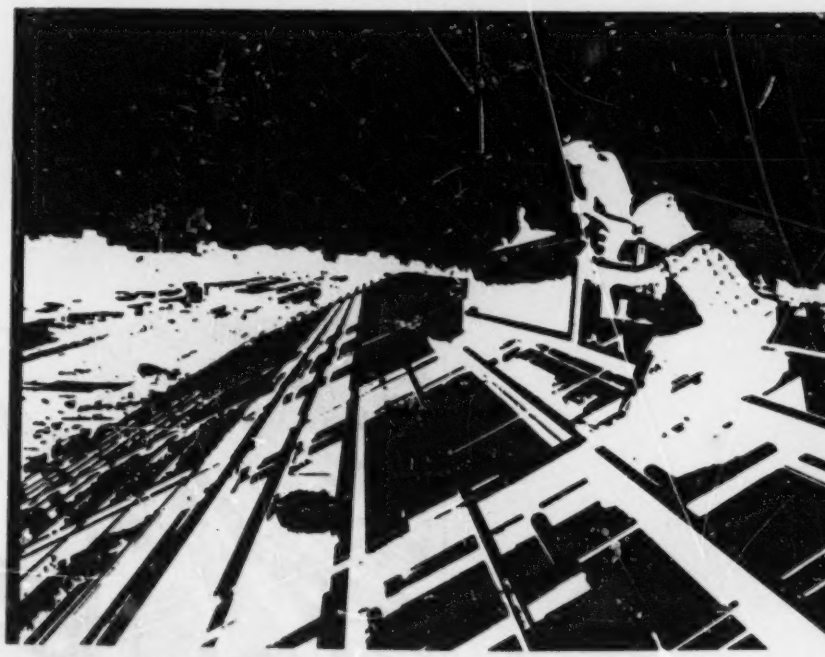

Executive Summary

The 1980 Active Solar Installations Survey, EIA-701, was conducted in the spring and summer of 1981 under the auspices of the Office of Coal, Nuclear, Electric, and Alternate Fuels in the Energy Information Administration. The survey covers active solar installations made during and prior to calendar year 1980.[1] As the first survey of active solar installations in the United States, the objective was to establish a national baseline information system that could provide current data on residential and commercial active solar installations as well as a listing of firms involved in the active solar industry, including installers[2].

Representatives from the four Regional Solar Energy Centers (RSEC's) and the Solar Energy Research Institute specified basic data requirements and the survey methodology. Potential respondents were identified from regional lists of solar equipment dealers and installers compiled by each RSEC. The RSEC lists were computerized and combined into a mailing list of 5,466 company names and addresses. Additional names, called referrals, were provided by survey respondents from the RSEC list. The total number of referrals was 1,619. However, because of resource constraints, 981 of these referrals were not included in the survey. It is estimated that exclusion of these 981 referrals understates the number of solar installations by approximately 10 percent on a national basis. In all, contact was attempted by mail and telephone or by telephone with 6,104 solar businesses. Total responses numbered 3,437.

To substantiate that the results of this survey represent accurate statistics on the number of active solar installations in the United States, a comparison was made to the Solar Collector Manufacturing Survey

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[1]Active solar installations are defined as those systems that require external mechanical power to move collected heat; thermosyphon water-heating systems are also included for purposes of this survey.

[2]For purposes of this survey, installers were those individuals or firms who identified themselves as responsible for the actual installation of active solar collectors.

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(EIA-63).3 This comparison showed that, on a national basis, active solar installations in 1980, as reported on the EIA-701, represent 96 percent of the solar collectors shipped by manufacturers in 1980, as reported on the EIA-63.

The results of the survey, presented in 20 tables, provide data as of December 31, 1980, on active solar installations in the residential and commercial sectors. The total number of installed systems reported nationwide during 1980 and prior to 1980 was 210,663. The number of existing active solar installations prior to 1980 represents only those systems installed by companies thought to be in existence during 1980 who responded to the EIA-701; these companies are not necessarily a complete enumeration of solar firms in business prior to 1980. Data do not include estimates for nonrespondents and companies not known to be in existence during 1980 and prior to 1980.

Of the nationwide total for 1980 and prior to 1980, 93,692 installations were reported for 1980. These were spread widely across all regions of the country. The highest concentrations, however, were in California and Florida where active solar systems have been in use for many years.

Based on the number of active solar installations made during 1980, 11 States and Puerto Rico each reported 1,400 or more installations (see Figure 1). California ranked first with more than twice as many as Florida, the second largest installation State. In descending order following Florida were Arizona, Puerto Rico, New York, Hawaii, Montana, Massachusetts, Wisconsin, Pennsylvania, Michigan, and Wyoming. For installations made before 1980, the order changed somewhat, although California, Florida, and Arizona remained as the highest three. Only 1 percent of all reported 1980 active solar installations were made in the commercial sector. Approximately 2 percent of all 1980 systems were installed in multifamily buildings, which were defined as having more than four-dwelling units. Twelve States reported no multifamily

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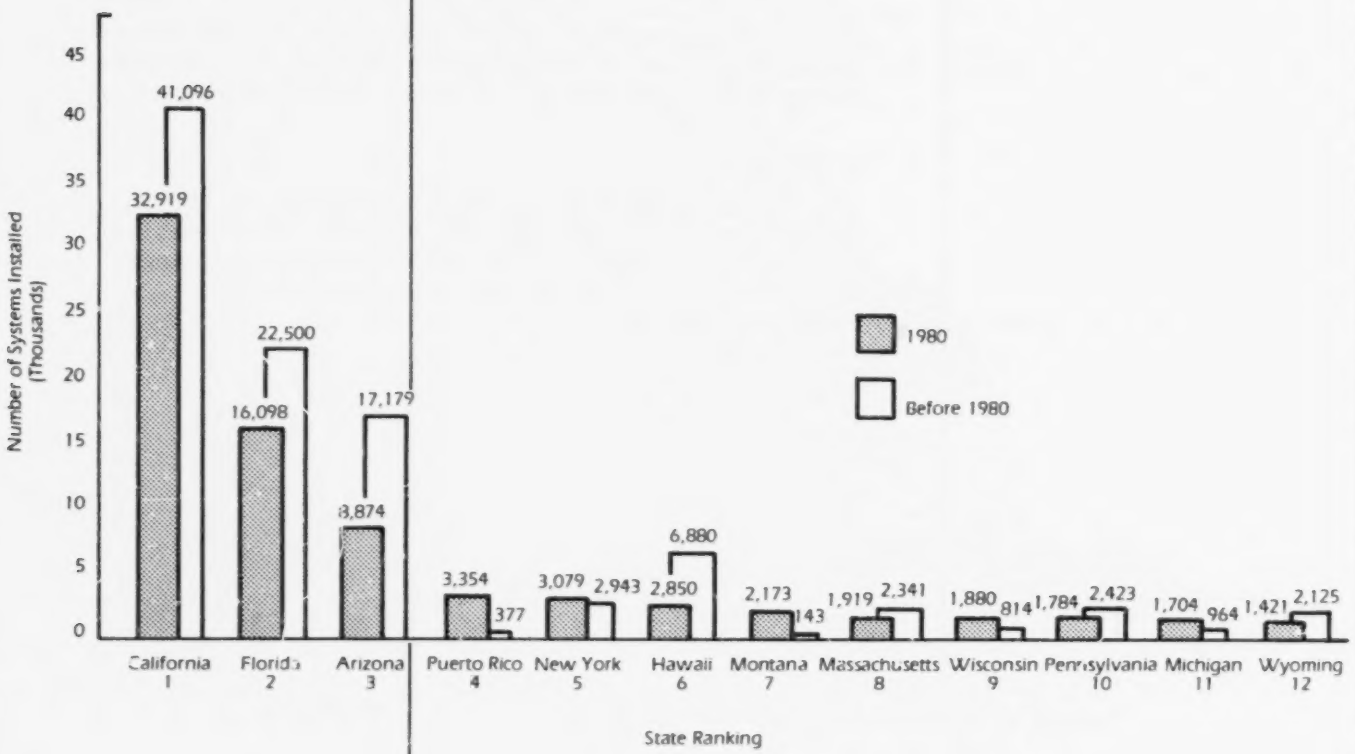
[3]The Solar Collector Manufacturing Survey is conducted by the Energy Information Administration, U.S. Department of Energy. The survey collects annual statistics on the shipments of solar collectors by U.S. manufacturers.

Figure 1. Top 12 States Ranked According to Number of Active Solar Installations



Note: *Includes Puerto Rico

1980 Active Solar Installations Survey
Energy Information Administration

installations. Eighty-four percent of total installations were water-heating units[4] and pool-heating units in single-family dwellings, which were defined as one-, two-, three-, or four-dwelling units. The reported average size of a single-family pool-heating system was 367 square feet with an average cost of $3,379. The reported average size of a single-family water-heating system was 59 square feet with an average cost of $2,892.

As the first active solar installations survey, the company names and addresses identified by the 1980 survey will form the basis for an upcoming survey in 1982 of active solar installations made in 1981. The 1981 survey will begin from an updated mailing list, which contains company names, addresses, and telephone numbers verified by respondents. It will also include all referrals not contacted in the 1980 survey.

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[4]Solar water-heating systems reported on the EIA-701 consist of systems for domestic water-heating applications in residential and commercial buildings and exclude pool heating and water heating for processing purposes.

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1. Introduction

Interest in solar energy for space and water heating rose sharply in the 1970's, stimulated largely by rapid increases in fossil fuel prices, general concerns about a curtailment of conventional fuel supplies, technical advances making solar a feasible energy source for commercial as well as residential use, and Federal incentives to explore the expanded application of solar energy in all sectors--residential, commercial, and industrial.

Under authority of the Department of Energy Organization Act (Public Law 95-91) and the Federal Energy Administration Act (Public Law 93-275), the first annual survey of active solar installations[1] gathered voluntary information from solar energy businesses located throughout the United States. The purpose of this survey was to collect baseline listings of currently operating solar system dealers and installers and to obtain data about the number and types of active solar installations nationally and on a State-by-State basis. This survey is the first effort to develop a statistical picture of national and State applications of active solar energy equipment. Future surveys are planned to enhance the quality and comprehensiveness of data.

Authority for the survey was assumed by the Energy Information Administration (EIA), specifically its Office of Coal, Nuclear, Electric, and Alternate Fuels. EIA obtained technical support from Applied Management Sciences, Inc. and its subcontractor, Opinion Research Corporation, for implementation of the 1980 Active Solar Installations Survey.

For the 1980 survey, mailing lists with company names, addresses, and telephone numbers of active solar system dealers and installers were compiled by DOE's four Regional Solar Energy Centers (RSEC's).

Each RSEC used the most current information available to them to compile mailing lists for the States in their region. Business listings were obtained by each RSEC from field and State energy offices, trade

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[1]For purposes of this survey, active solar systems are those that rely on mechanical power to move collected heat. Thermosyphon systems are included even though they are passive because they constitute a significant portion of the solar water-heating systems currently being installed.

Introduction (continued)

associations, solar energy associations, industry contacts, and telephone directories. Applied Management Sciences combined the mailing lists from each RSEC and developed a computerized mailing list of 5,466 solar businesses. These 5,466 firms were mailed the EIA-701, 1980 Active Solar Installations Survey questionnaire (see Appendix). A total of 1,313 respondents returned mail questionnaires. The 4,153 respondents who did not respond to the mail questionnaire were scheduled for telephone followup. Telephone contact with these businesses resulted in an additional 1,805 completed responses.

Although it was believed that the 5,466 names on the combined RSEC mailing list represented the majority of business activity in the active solar industry, the survey questionnaire was designed to enhance the RSEC list by requesting respondents to provide additional names of active solar installers with whom they were familiar. A computerized list of these additional names, called referrals, was compiled. Referrals that duplicated name and telephone listings on the combined RSEC list were eliminated. Altogether, there were 1,587 nonduplicate or new business listings--referrals. A sample of 638 referrals was surveyed by telephone, resulting in 295 complete responses.

In all, a total of 3,437 questionnaires were completed--3,118 from the combined RSEC list, 295 referrals, and 24 unidentified installers.[2] The data reported in this publication are based on these responses.

This report contains national and State data about residential and commercial active solar installations made during and before calendar year 1980. The number of existing active solar installations prior to 1980 represents only those systems installed by companies thought to be in existence during 1980 who responded to the EIA-701; these companies are not necessarily a complete enumeration of solar firms in business prior to 1980. Data do not include estimates for nonrespondents and companies not known to be in existence during 1980 and prior to 1980.

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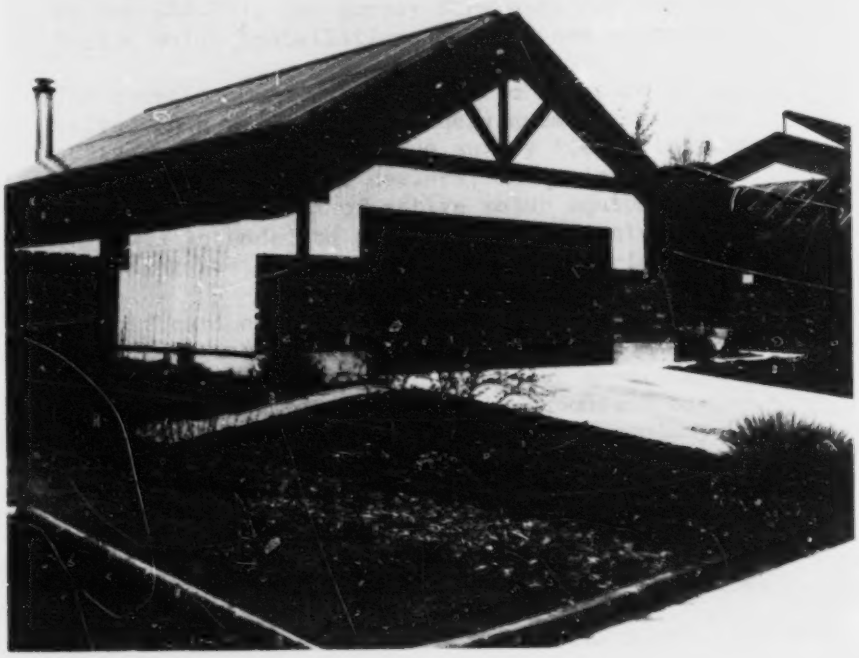
[2]Twenty-four mailed questionnaires that were returned contained no identifying State or company information. These 24 respondents were classified as unknown solar installers (not on the combined RSEC list).

Introduction (continued)

All 50 States plus Puerto Rico, the Virgin Islands, and the District of Columbia are included. Both the national and State data sections present information regarding the number, average size, and average total cost of installations by system application in the residential and commercial sectors. The residential sector is subdivided into single-family residences, which are defined as up to four-dwelling units, and into multifamily buildings, which include more than four-dwelling units. The national data section also highlights the residential sector and its water- and pool-heating systems as well as installation firms in terms of system applications and the number, average size, and average total cost of installations. Together, the national and State data present a composite picture of the active solar industry nationally and by State. Identification of business trends related to technology, regional product demand, and market changes in the residential and commercial sectors are the focus of the selected data cross-tabulations.

A survey of 1981 installations is planned for implementation and analysis in 1982. The upcoming survey will use a refined survey form and mailing list inclusive of the 981 referrals not contacted during the 1980 survey.



2. Methodology

The technical approach for this survey involved eight steps in addition to planning and management of the survey:

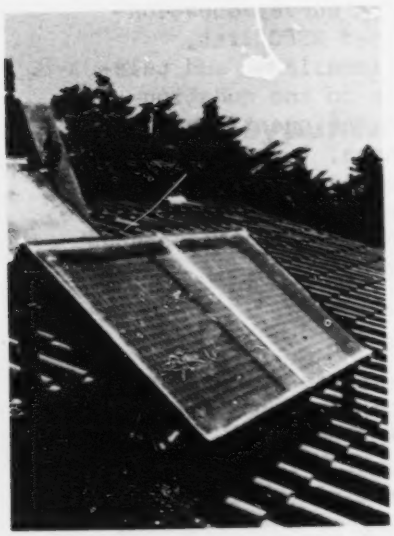
- Review of survey form
- Compilation and computerization of respondent lists
- Mailing and receipt control of questionnaires
- Followup by telephone with mail nonrespondents
- Processing referrals
- Edit and keypunch of completed questionnaires
- Cross-tabulation and analysis of data
- Evaluation of frame size.

Representatives from DOE's four Regional Solar Energy Centers and the Solar Energy Research Institute specified the basic data requirements and the methodology for this survey. The survey form was designed originally by the Southern Solar Energy Center in Atlanta, Georgia. In conjunction with EIA personnel, technical staff at Applied Management Sciences of Silver Spring, Maryland, and Opinion Research Corporation of Princeton, New Jersey, reviewed the questionnaire for formatting and consistency. After minor modifications to the original RSEC form, the revised questionnaire was forwarded to the Office of Management and Budget for approval. Their approval in April 1981 resulted in the EIA-701, the survey form used for the 1980 Active Solar Installations Survey (see Appendix).

The questionnaire was designed to identify firms involved in a variety of business areas within the active solar industry. The survey identified manufacturers, distributors, dealers, installers, homebuilders, and architects of active solar equipment. The form was intended to survey, however, only installers regarding systems installed during or prior to 1980.

Identification of solar business groups other than installers was considered useful reference information for future EIA activity in the solar area. All questions were designed to minimize respondent burden. Attention was drawn to the request for contact information about other installers, called referrals, who were known by respondents. These referrals were intended to become the second tier of the data collection process, the first tier being potential respondents from the combined RSEC mailing list.

Survey Form



2. Methodology (continued)

Mailing List

The survey mailing list was compiled by the RSEC's from existing regional name and address lists of local solar businesses. Each individual RSEC mailing list was computerized to produce one combined RSEC list containing 5,466 names, addresses, and telephone numbers. This combined RSEC list was used to mail the self-administered questionnaire to all 5,466 firms, along with an introductory letter which included submission information about provisions to protect business confidentiality.

The total number of companies on the combined RSEC list (5,466) was distributed among the four RSEC's as follows: Northeast Solar Energy Center, Boston, Massachusetts--1,107; Mid-America Solar Energy Complex, Bloomington, Minnesota--1,155; Western Solar Utilization Network, Portland, Oregon--1,386; and Southern Solar Energy Center, Atlanta, Georgia--1,818.

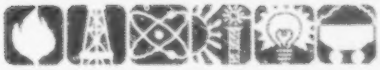
Mailing and Receipt Control

The survey questionnaire was mailed on April 16, 1981, to the 5,466 firms on the combined RSEC list. Respondents were asked to complete the questionnaire and return the survey form within two weeks to Opinion Research Corporation in the self-addressed, stamped envelope provided.

Survey implementation was a two-tiered process. The first tier involved mail-out of the survey questionnaire to 5,466 firms on the combined RSEC list, receipt control of returned questionnaires, and telephone followup with nonrespondents to the questionnaire mail-out. The mailing of 5,466 questionnaires resulted directly in 1,313 responses, 4 refusals, and 4,149 nonresponses. The 1,313 completed questionnaires were checked manually to ensure completeness, legibility, and accuracy prior to assignment of status codes for tracking and processing purposes.

Telephone Followup

For questionnaires that were incomplete or contained obvious errors, telephone calls were made to resolve problems or to retrieve missing information. The mail questionnaire was reformatted slightly for these followups to ease questionnaire administration by telephone. The content and wording of both questionnaires, however, was the same. Telephone followup



2. Methodology (continued)

with mail nonrespondents began May 8, 1981, and ended June 1, 1981. This resulted in:

- 1,805 additional, complete responses.
- 315 refusals.
- 726 listings without a working telephone number, out-of-business, or not in the active solar business.
- 1,068 business listings with which contact could not be made either by mail or telephone (designated unreachables).3
- 235 duplicate listings identified during the data collection process as previous respondents, refusals, out-of-business, nonworking number, or unreachable.

Referral Processing

The second tier of the survey process involved (1) computerizing the names, addresses, and telephone numbers of referrals identified by first-tier respondents, (2) matching these listings against the combined RSEC list to eliminate duplicates, and (3) contacting nonduplicate referrals by telephone. A total of 2,609 referrals were provided by first-tier respondents. These referrals were then matched by telephone number against the combined RSEC list to eliminate duplication; there were a total of 1,619 nonduplicate referral listings. Out of this number, 638 referrals were sampled, resulting in 32 additional duplicates, 32 nonworking telephone numbers, 5 refusals, 295 complete responses, and 274 unreachables.

Edit and Keypunch

Edit specifications were developed and utilized to check all returned mail questionnaires and telephone interviews for completeness, accuracy, and legibility. Appropriate status codes were also developed for purposes of tracking and processing all 6,104 listings with whom contact was attempted. Once sorted by status code, the completed forms were keypunched, machine-edited, and then entered into the data base. In most cases where responses failed the edit test, telephone followup calls were made to verify responses.

3Unreachables included firms that could not be located once their mailing list contact information proved no longer accurate or firms that did not respond after a minimum of two and up to six calls were attempted.

Cross-tabulation and Analysis

The cross-tabulations were developed by EIA in conjunction with the U.S. Department of Energy's Office of Conservation and Renewable Energy. The cross-tabulations compare solar activity variables such as sales, type, number, average total cost, and average size of installations. Most data were computed for building type and application. Single-family dwellings and multifamily buildings compose the residential sector building type, with the commercial sector being the third building type. The commercial sector includes the combined reporting of installations for retail, wholesale, office, institutional, and industrial buildings. The application cross-tabulations for each building type include Pool Heating, Water Heating, Space Heating, Combined Space and Water Heating, and "Other." A systematic breakdown of the "Other" category is not available.

Averages by system applications were computed for installation cost and size. The averages were weighted by the number of systems actually installed in a particular category. This allows inferences about different types of solar energy systems.

A secondary analysis was performed comparing the EIA-701, Active Solar Installations Survey, with data obtained from the EIA-63, Solar Collector Manufacturing Survey. The data were compared by application in Table 1. EIA-701 compared favorably for all applications. When the total reported for EIA-701 was compared to the adjusted total reported for EIA-63, EIA-701 captured more than 95 percent of the solar market.

Frame Evaluation

Table 2 contains the total number of business listings surveyed. Businesses are distributed between RSEC listings and referrals. Tables 3 through 6 contain a detailed breakdown of the number of business listings for each RSEC. Both the initial business lists provided by the RSEC's and the referral listings contained duplicate entries and out-of-scope establishments. Therefore, the number of in-scope establishments on these lists is less than the total count. The number of duplicates identified by computerized and manual editing of the business listings are contained in Tables 2 through 6. A conservative assumption is that these are all the duplicates in the listings. Therefore, by subtracting the number of duplicates from the number on the initial list, the number of "unduplicated" listings is

2. Methodology (continued)

Table. 1 Comparison of EIA-63 and EIA-701 Results by Application

Application	1980 EIA-63 (Square Feet)	1980 EIA-701 (Square Feet)	Comparison (Percent)
Water Heaters . . .	4,902,000	3,343,227	--
Space Heaters . . .	1,768,000	1,072,581	--
Water and Space Heaters	--	2,959,278	--
Subtotal	6,670,000	7,011,086	105
Space Cooling . . .	160,000	--	--
Industry Process . .	384,000	--	--
Agricultural	47,000	--	--
Other	303,000	--	--
Subtotal	894,000	559,972	67
Pool Heaters	11,893,000	10,181,758	86
Total	19,457,000	--	--
Adjusted Total[a]	18,579,663	17,802,049	96

[a]Total minus exports plus imports.

"--" = Not applicable because the two surveys do not similarly define these items.

Source: Forms EIA-63 and EIA-701.

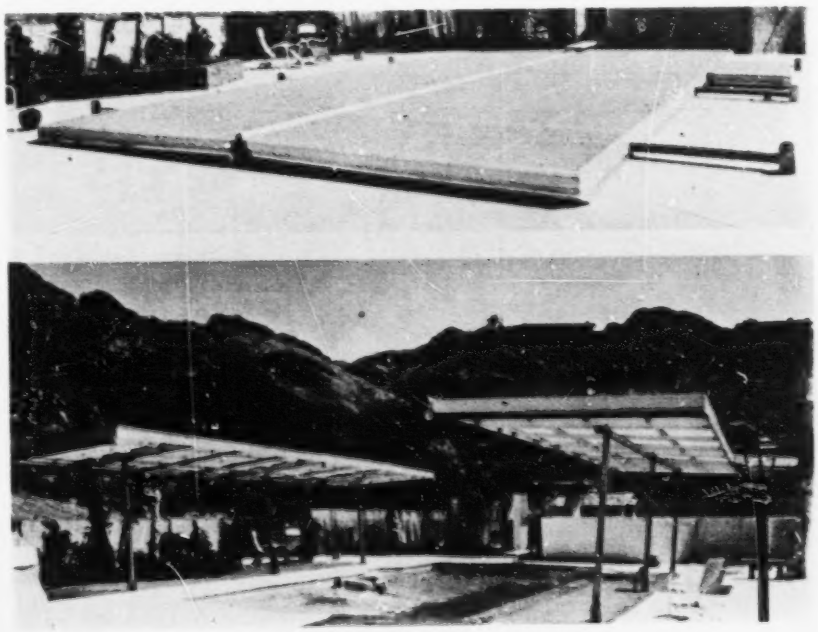


Table 2. Number of Businesses Contacted from all Regional Solar Energy Center (RSEC) Lists

Status	RSEC List	Referrals	
		Sampled	Not Sampled
Complete Response			
Respondent[a]	3,118	295	--
Out-of-Scope	726	32	--
Incomplete Response			
Refusals	319	5	--
Unreachables	1,068	274	--
Duplicates	235	32	--
Initial List Total	5,466	638	981
Estimated Frame	4,243	547	840
Estimated Response Rate (Percent)	73	54	--

[a] Total number of respondents equals 3,437 (3,118 from the original RSEC list, 295 referrals, and 24 unknown solar dealers).

"--" = Not applicable.

Note: Duplicates are identified as previous respondents, out-of-scope respondents, refusals, or unreachables.

Source: EIA-701 frame.

2. Methodology (continued)

Table 3. Number of Businesses Contacted in the Southern Solar Energy Center (SSEC) Region

Status	SSEC List	Referrals	
		Sampled	Not Sampled
Complete Response			
Respondent	1,060	68	--
Out-of-Scope	279	9	--
Incomplete Response			
Refusals	113	2	--
Unreachables	290	73	--
Duplicates	76	15	--
Initial List Total	1,818	167	347
Estimated Frame	1,379	134	279
Estimated Response Rate (Percent)	77	51	--

"--" = Not applicable.

Note: Duplicates are identified as previous respondents, out-of-scope respondents, refusals, or unreachables.

Source: EIA-701 frame.

2. Methodology (continued)

Table 4. Number of Businesses Contacted in the Western Solar Utilization Network (WSUN) Region

Status	WSUN List	Referrals	
		Sampled	Not Sampled
Complete Response			
Respondent	752	74	--
Out-of-Scope	207	10	--
Incomplete Response			
Refusals	63	1	--
Unreachables	315	59	--
Duplicates	49	3	--
Initial List Total	1,386	147	320
Estimated Frame	1,048	127	276
Estimated Response Rate (Percent)	72	58	--

"--" = Not applicable.

Note: Duplicates are identified as previous respondents, out-of-scope respondents, refusals, or unreachables.

Source: EIA-701 frame.

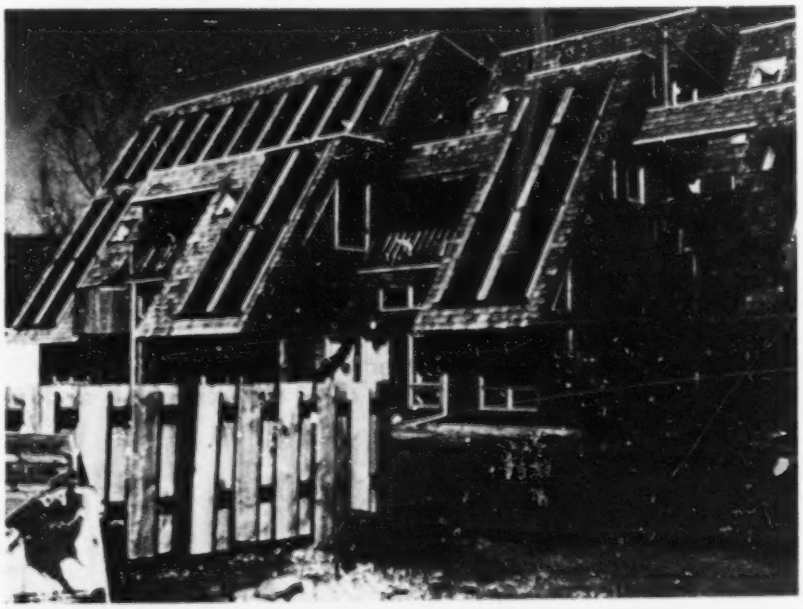
Table 5. Number of Businesses Contacted in the Mid-America Solar Energy Complex (MASEC) Region

Status	MASEC List	Referrals	
		Sampled	Not Sampled
Complete Response			
Respondent	655	89	--
Out-of-Scope	137	7	--
Incomplete Response			
Refusals	60	1	--
Unreachables	251	85	--
Duplicates	52	5	--
Initial List Total	1,155	187	139
Estimated Frame	912	169	125
Estimated Response Rate (Percent)	72	53	--

"--" = Not applicable.

Note: Duplicates are identified as previous respondents, out-of-scope respondents, refusals, or unreachables.

Source: EIA-701 frame.



2. Methodology (continued)

Table 6. Number of Businesses Contacted in the Northeast Solar Energy Center (NESEC) Region

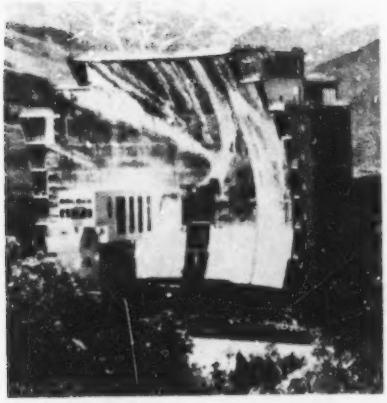
Status	NESEC List	Referrals	
		Sampled	Not Sampled
Complete Response			
Respondent	651	64	--
Out-of-Scope	103	6	--
Incomplete Response			
Refusals	83	1	--
Unreachables	212	57	--
Duplicates	58	9	--
Initial List Total	1,107	137	175
Estimated Frame	906	117	149
Estimated Response Rate (Percent)	72	55	--

"--" = Not applicable.

Note: Duplicates are identified as previous respondents, out-of-scope respondents, refusals, or unreachables.

Source: EIA-701 frame.

2. Methodology (continued)



obtained. For example, in Table 2 under the RSEC list column, 235 duplicates are subtracted from 5,466 to obtain 5,231.

Further calculation is required to determine the number of in-scope establishments represented by this list of "unduplicated' establishments. Only establishments listed in the table under the heading Complete Response can be classified as in-scope or out-of-scope. Establishments that refused to participate or that were unreachable cannot be so classified. A conservative assumption is that the proportion of establishments in-scope with complete responses is equal to the proportion of establishments in-scope with incomplete responses. This assumption is conservative because it is expected that refusals and unreachables represent a much lower proportion of in-scope establishments. The method employed to obtain an estimated frame size was to use the proportion of establishments in-scope with completed responses to adjust the "unduplicated" total. Thus, for Table 2, 3,118 of the 3,844 establishments with complete responses were in-scope. The in-scope proportion is, therefore, 0.811. Applying this proportion to the number of unduplicated establishments (5,231) gives an estimated frame size of 4,243.

At best, this method is expected to overestimate the frame size. Overestimation, of course, results in lower estimated response rates. The most significant factor is that no appreciable difference exists for the estimated response rate between the RSEC's.

As indicated in Table 2, 638 referrals were sampled and 981 were not sampled. The 638 sampled referrals contributed 7 percent of the total reported installations and 8 percent of the total reported square footage. Using these values and assuming no significant difference between sampled and not sampled referrals allows a simple estimate of the contribution expected if the not sampled referrals had been surveyed. An 11 percent (7 percent x 981/638) increase in the total number of installations reported and a 12 percent (8 percent x 981/638) increase in the total square footage reported can be estimated.

3. National Data

Nine tables compose this section which presents nationwide data for reported installations in single-family and multifamily residences and in commercial buildings. Installations made during 1980 only are covered by these tables. Total number, average size, and average total cost of installations by application comprise the majority of data presented, though sales and installation firms are also represented in this set of information.

Tables 7 through 9 report national numbers, average size, and average total cost of 1980 installations in terms of application and building type. Data in Tables 8 and 9 are weighted averages based on the number of actual installations in any application and building type.

Tables 10 and 11 present, respectively, national data on single-family residential water heaters[4] and numbers and percentages of prefabricated and site-built installations. Table 12 reports the number of firms and relative percentage of their total number of installations and the percentage of total business sales that represents their volume of solar energy business. Tables 13, 14, and 15 identify the number of installation firms nationwide in terms of the number, average size, and average total cost of 1980 installations.

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[4]Solar water-heating systems reported on the EIA-701 consist of systems for domestic water-heating applications in residential and commercial buildings and exclude pool heating and water heating for processing purposes.

Table 7. Number of 1980 Active Solar Installations Nationwide Classified by Application and Building Type

Building Type	Application				
	Pool Heating	Water Heating Only	Space Heating Only	Water and Space Heating	Other[a]
Single-family	367 (N=25,015)	[b]59 (N=50,420)	186 (N=6,333)	358 (N=6,517)	162 (N=1,389)
Multifamily	888 (N=792)	193 (N=1,131)	167 (N=34)	360 (N=285)	1,800 (N=65)
Commercial	1,208 (N=242)	388 (N=488)	702 (N=197)	1,185 (N=142)	3,108 (N=83)

[a]Includes (1) space cooling, (2) space cooling and heating, (3) space cooling and water heating, or (4) space cooling and heating and water heating.

[b]This category is subdivided in Table 10 into retrofit and new construction systems.

Note: These are weighted averages. N equals the number of actual installations out of a possible total of 93,692. Not all firms reporting the total number of installations made also reported the average size of the systems they installed; consequently, N does not equal 93,692.

Source: Form EIA-701.

Table 8. Average Sizes of 1980 Active Solar Installations Nationwide Classified by Application and Building Type (Square Feet)

Building Type	Application					
	Pool Heating	Water Heating Only	Space Heating Only	Water and Space Heating	Other[a]	Total
Single-family	25,106	[b]50,569	6,358	6,558	1,624	90,215
Multifamily	793	1,184	34	246	65	2,282
Commercial	283	512	205	146	89	1,195
Total	26,182	52,225	6,597	6,950	1,778	93,692

[a]Includes (1) space cooling, (2) space cooling and heating, (3) space cooling and water heating, or (4) space cooling and heating and water heating.

[b]This category is subdivided in Table 10 into retrofit and new construction systems.

Note: These numbers are based on firms reporting installations.

Source: Form EIA-701.

3. National Data (continued)

Table 9. Average Total Costs of 1980 Active Solar Installations Nationwide Cliassified by Application and Building Type (Dollars)

Building Type	Application				
	Pool Heating	Water Heating Only	Space Heating Only	Water and Space Heating	Other[a]
Single-family	3,379 (N=24,979)	[b]2,898 (N=49,521)	3,591 (N=8,487)	8,689 (N=6,672)	3,921 (N=1,586)
Multifamily	6,803 (N=793)	5,713 (N=1,137)	2,785 (N=34)	11,987 (N=286)	49,018 (N=63)
Commercial	13,377 (N=242)	11,974 (N=477)	10,932 (N=194)	47,919 (N=183)	125,283 (N=80)

[a]Includes (1) space cooling, (2) space cooling and heating, (3) space cooling and water heating, or (4) space cooling and heating and water heating.

[b]This category is subdivided in Table 10 into retrofit and new construction systems.

Note: These are weighted averages. N equals the number of actual installations out of a possible total of 93,692. Not all firms reporting the total number of installations made also reported the average total cost of the systems they installed; consequently, N does not equal 93,692.

Source: Form EIA-701.

Table 10. Water-heating Installations Nationwide in New and Existing Single-family Dwellings

Construction Method	Number	Percentage of Total	Average Size (Square Feet)	Average Cost (Dollars)
New Construction	7,729 (N=721)	15.8	[a]72 (N=702)	2,929 (N=702)
Retrofit	41,179 (N=1,173)	84.2	[a]73 (N=1,152)	3,039 (N=1,150)
Total	48,908	100.0	--	--

[a]These figures represent the simple average size whereas the figure in Table 8 for single-family water heating only represents the weighted average size. The simple average is computed by summing all the reported average size values then dividing the sum by the number of respondents.

"_ _" = Not applicable.

Note: N is the number of valid responses based on a subset of 3,437 respondent firms. Some respondents did not complete certain portions of the question used to obtain these data. Therefore, the total number of these installations equals 48,908, not the total 50,569 described in Table 7.

Source: Form EIA-701.

3. National Data (continued)

Table 11. Construction Methods Used Nationwide for 1980 Active Solar Installations

Application	Construction Method				Total Number
	Prefabricated		Site Built		
	Number	Percentage	Number	Percentage	
Single-family	13,843	90.7	1,412	9.3	15,255
Multifamily	3,466	95.5	162	4.5	3,628
Commercial	12,247	96.2	484	3.8	12,731
Total	29,556	93.4	2,058	6.5	31,614

Note: These numbers are based on 34 percent of the installed systems because of a significant number of nonresponses to this question.

Source: Form EIA-701.

Table 12. National Distribution of 1980 Active Solar Installations and Sales by Number of Installation Firms and Distribution Percentage

Distribution	Number of Firms	Percentage of Distribution Total
Number of Installations		
0	1,723	50.1
1 - 25	1,246	36.3
26 - 50	166	4.8
51 - 75	84	2.4
76 - 100	44	1.3
101 - 499	144	4.2
500 - 999	17	0.5
More than 1,000	13	0.4
Total	3,437	100.0
Percentage of Total Business Sales From Active Solar Systems		
0	1,277	37.2
1 - 24.9	1,148	33.4
25 - 49.9	149	4.3
50 - 74.9	141	4.1
75 - 100	722	21.0
Total	3,437	100.0

Note: Although a total of 1,761 installers reported installation data on the EIA-701, as stated on Table 20, 47 of these installers did not indicate the number of systems they installed in 1980. Consequently, these 47 installers are subsumed into the category of firms reporting zero installations.

Source: Form EIA-701.

3. National Data (continued)

Table 13. Distribution of Firms Nationwide Installing Active Solar Systems in 1980 by Application and Number of Installations

Application	Number of Systems Installed									
	None	1	2	3	4	5	6-10	11-25	26-75	Greater than 75
Single-family										
Pool Heating	2,836	131	92	57	23	20	84	91	63	40
Water Heating	2,123	198	185	106	79	64	195	221	172	138
Space Heating	3,138	115	52	38	16	15	26	23	5	9
Water and Space Heating	2,767	241	121	75	52	41	66	49	19	6
Other[a]	3,275	55	33	16	13	9	17	14	2	3
Multifamily										
Pool Heating	3,324	29	21	16	12	6	18	11	3	1
Water Heating	3,285	70	25	10	9	10	12	8	4	4
Space Heating	3,430	1	2	3	0	0	0	1	0	0
Water and Space Heating	3,410	13	4	1	1	1	3	1	2	1
Other[a]	3,426	6	1	0	1	1	1	0	1	0
Commercial										
Pool Heating	3,368	33	15	5	3	3	5	5	0	0
Water Heating	3,207	138	43	17	13	6	10	1	2	0
Space Heating	3,334	74	12	3	5	3	4	2	0	0
Water and Space Heating	3,340	69	21	3	1	0	3	0	0	0
Other[a]	3,395	26	6	4	2	2	1	1	0	0

[a]Includes (1) space cooling, (2) space cooling and heating, (3) space cooling and water heating, or (4) space cooling and heating and water heating.

Note: These values are based on firms reporting installations.

Source: Form EIA-701.

3. National Data (continued)

Table 14. Distribution of Firms Nationwide Installing Active Solar Systems in 1980 by Application and Size of Installations

Application	Average Size of Systems				
	None	1 - 75 ft^2	76 - 175 ft^2	176 - 500 ft^2	Greater than 500 ft^2
Single-family					
Pool Heating	2,844	25	47	470	51
Water Heating	2,135	1,059	218	20	10
Space Heating	3,147	66	71	126	27
Water and Space Heating	2,776	38	178	109	49
Other[a]	3,289	41	50	44	13
Multifamily					
Pool Heating	3,324	1	0	45	67
Water Heating	3,286	36	45	51	19
Space Heating	3,430	1	2	3	1
Water and Space Heating	3,411	1	6	8	11
Other[a]	3,426	1	2	3	5
Commercial					
Pool Heating	3,369	8	2	15	47
Water Heating	3,213	72	60	55	37
Space Heating	3,339	19	22	33	24
Water and Space Heating	3,383	4	8	40	42
Other[a]	3,398	4	9	8	18

[a]Includes (1) space cooling, (2) space cooling and heating, (3) space cooling and water heating, or (4) space cooling and heating and water heating.

Note: These values are based on firms reporting installations.

Source: Form EIA-701.

3. National Data (continued)

Table 15. Distribution of Firms Nationwide Installing Active Solar Systems in 1980 by Application and Cost of Installations

Application	Average Total Cost of System				
	None	$1 - $2,500	$2,501 - $5,000	$5,001 - $10,000	Greater than $10,000
Single-family					
Pool Heating	2,847	181	329	55	25
Water Heating	2,140	430	848	15	4
Space Heating	3,150	66	76	97	48
Water and Space Heating	2,778	26	73	332	228
Other[a]	3,281	43	48	42	27
Multifamily					
Pool Heating	3,323	5	41	58	18
Water Heating	3,289	24	61	43	40
Space Heating	3,430	3	1	2	1
Water and Space Heating	3,410	0	5	8	14
Other[a]	3,427	1	3	2	4
Commercial					
Pool Heating	3,369	5	20	13	30
Water Heating	3,222	38	80	40	57
Space Heating	3,339	20	17	26	35
Water and Space Heating	3,393	4	6	15	69
Other[a]	3,399	6	9	5	18

[a]Includes (1) space cooling, (2) space cooling and heating, (3) space cooling and water heating, or (4) space cooling and heating and water heating.

Note: These values are based on firms reporting installations.

Source: Form EIA-701.

4. State Data

This section, composed of Tables 16 through 20, reports data again about number, average size, and average total cost of 1980 installations in terms of application and building type. All five tables present data from each State as well as Puerto Rico, the Virgin Islands, and the District of Columbia.

Like the national data Tables 8 and 9 that report weighted averages, Tables 18 and 19 base their weighted averages on the number of actual installations rather than on the number of respondent firms.

Table 20 compares the number of survey respondents with the number of actual installers reporting data for any one State. In instances where fewer than three installers in a State report installation data or where weighted averages are based on fewer than three actual installations, these data are included in the "Other" category. This is done in all State tables because the values have a larger than acceptable variance.

4. State Data (continued)

Table 16. Number of Active Solar Installations Classified by State for 1980 and Before 1980

State	Number of Installations		
	1980	Before 1980	Total
Alabama	133 (N=17)	107 (N=20)	240
Arizona	8,874 (N=41)	17,179 (N=42)	26,053
California	32,919 (N=203)	41,096 (N=208)	74,015
Colorado	1,312 (N=59)	1,221 (N=58)	2,533
Connecticut	1,152 (N=44)	1,470 (N=44)	2,622
Delaware	55 (N=11)	37 (N=9)	92
District of Columbia	4 (N=4)	9 (N=7)	13
Florida	16,098 (N=222)	22,500 (N=178)	38,598
Georgia	287 (N=21)	497 (N=23)	784
Hawaii	2,850 (N=17)	6,880 (N=15)	9,730
Idaho	169 (N=26)	239 (N=18)	408
Illinois	532 (N=65)	597 (N=82)	1,129
Indiana	164 (N=38)	337 (N=39)	501
Iowa	160 (N=28)	333 (N=27)	493

Note: N equals the number of firms reporting the number of installations presented. Most respondents reported installations by State of origin. However, a small percentage of the respondents also reported installations that they made in other States.

Source: Form EIA-701.

Table 16. Number of Active Solar Installations Classified by State for 1980 and Before 1980 (continued)

State	Number of Installations		
	1980	Before 1980	Total
Kansas	147 (N=25)	166 (N=29)	313
Kentucky	50 (N=14)	36 (N=8)	86
Louisiana	80 (N=11)	136 (N=8)	216
Maine	223 (N=28)	257 (N=25)	480
Maryland	685 (N=26)	613 (N=28)	1,298
Massachusetts	1,919 (N=75)	2,341 (N=59)	4,260
Michigan	1,704 (N=36)	964 (N=36)	2,668
Minnesota	813 (N=49)	260 (N=49)	1,073
Mississippi	19 (N=5)	26 (N=9)	45
Missouri	37 (N=18)	97 (N=29)	134
Montana	2,173 (N=12)	143 (N=9)	2,316
Nebraska	171 (N=27)	172 (N=30)	343
Nevada	958 (N=21)	663 (N=21)	1,621
New Hampshire	226 (N=37)	310 (N=39)	536
New Jersey	798 (N=91)	1,500 (N=80)	2,298

Note: N equals the number of firms reporting the number of installations presented. Most respondents reported installations by State of origin. However, a small percentage of the respondents also reported installations that they made in other States.

Source: Form EIA-701.

4. State Data (continued)

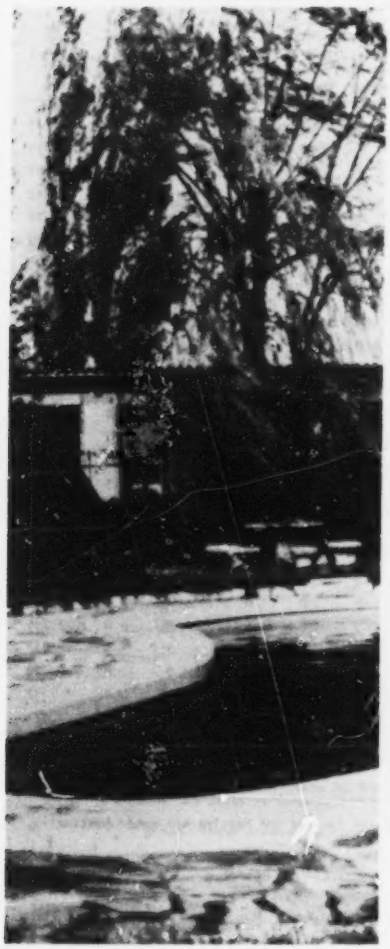
Table 16. Number of Active Solar Installations Classified by State for 1980 and Before 1980 (continued)

State	Number of Installations		
	1980	Before 1980	Total
New Mexico	631 (N=22)	610 (N=24)	1,241
New York	3,079 (N=81)	2,943 (N=82)	6,022
North Carolina	528 (N=32)	396 (N=32)	924
North Dakota	56 (N=10)	70 (N=12)	126
Ohio	301 (N=28)	724 (N=31)	1,025
Oklahoma	340 (N=15)	265 (N=15)	605
Oregon	915 (N=66)	994 (N=45)	1,909
Pennsylvania	1,784 (N=96)	2,423 (N=113)	4,207
Puerto Rico	3,354 (N=7)	377 (N=5)	3,731
Rhode Island	530 (N=25)	437 (N=25)	967
South Carolina	78 (N=15)	106 (N=13)	184
South Dakota	245 (N=31)	204 (N=19)	449
Tennessee	698 (N=20)	130 (N=19)	828
Texas	1,324 (N=57)	1,957 (N=51)	3,281
Utah	140 (N=12)	247 (N=8)	387

Note: N equals the number of firms reporting the number of installations presented. Most respondents reported installations by State of origin. However, a small percentage of the respondents also reported installations that they made in other States.

Source: Form EIA-701.

Table 16. Number of Active Solar Installations Classified by State for 1980 and Before 1980 (continued)



State	Number of Installations		
	1980	Before 1980	Total
Vermont	230 (N=20)	264 (N=22)	494
Virginia	673 (N=46)	750 (N=42)	1,423
Washington	511 (N=26)	878 (N=24)	1,389
West Virginia	22 (N=6)	24 (N=6)	46
Wisconsin	1,880 (N=62)	814 (N=63)	2,694
Wyoming	1,421 (N=29)	2,125 (N=25)	3,546
Other[a]	240 (N=32)	57 (N=9)	297
Total	93,692	[b]116,981	210,673

[a]Includes installations for Alaska, Arkansas, and the Virgin Islands plus all completed mail questionnaires given a special code because they were received without any State or company identification.

[b]The number of existing active solar installations prior to 1980 represents only those systems installed by companies thought to be in existence during 1980 who responded to the EIA-701; these companies are not necessarily a complete enumeration of solar firms in business prior to 1980. Data do not include estimates for nonrespondents and companies not known to be in existence during 1980 and prior to 1980.

Note: N equals the number of firms reporting the number of installations presented. Most respondents reported installations by State of origin. However, a small percentage of the respondents also reported installations that they made in other States.

Source: Form EIA-701.

4. State Data (continued)

Table 17. Number of 1980 Active Solar Installations Classified by Application and State

State	Application															Total
	Single-family					Multifamily					Commercial					
	Pool Heating	Hot Water Only	Space Heating Only	Water & Space Heating	Other[a]	Pool Heating	Hot Water Only	Space Heating Only	Water & Space Heating	Other[a]	Pool Heating	Hot Water Only	Space Heating Only	Water & Space Heating	Other[a]	
Alabama	10	79	1	31	0	0	5	0	0	0	0	4	1	1	1	133
Arizona	531	7,881	6	221	10	18	13	0	0	4	21	52	3	4	8	8,874
California	15,375	11,607	257	786	628	391	522	0	196	50	77	120	4	27	9	30,919
Colorado	41	811	88	278	33	0	32	0	7	0	5	3	1	13	0	1,312
Connecticut	6	1,059	11	49	11	0	5	0	0	0	4	6	1	3	0	1,152
Delaware	2	48	0	3	0	0	1	0	0	0	0	0	0	1	0	55
District of Columbia	0	2	1	1	0	0	0	0	0	0	0	0	0	0	0	4
Florida	8,985	8,240	1,819	207	74	335	262	0	1	0	96	69	1	1	8	16,098
Georgia	28	119	10	109	3	0	1	0	1	0	0	17	2	2	0	287
Hawaii	805	2,379	0	0	3	0	55	0	0	0	1	7	0	0	0	2,850
Idaho	10	93	19	56	4	0	0	0	0	0	0	3	12	0	2	169
Illinois	128	130	101	105	25	0	0	0	9	0	1	9	10	3	9	532
Indiana	10	69	13	85	8	0	1	3	0	0	1	9	3	1	1	164
Iowa	4	92	13	55	4	0	0	0	0	0	0	7	3	2	0	160
Kansas	0	48	5	69	1	0	0	0	2	8	0	3	2	4	5	147
Kentucky	3	25	3	13	0	0	0	0	0	0	1	2	1	2	0	50
Louisiana	26	42	0	6	1	0	0	0	0	0	1	2	0	2	0	80
Maine	12	120	23	25	30	0	3	0	4	0	0	3	3	0	0	223
Maryland	28	558	9	75	8	0	1	0	0	0	0	5	0	1	0	685
Massachusetts	53	1,680	12	119	15	0	28	0	0	0	0	8	0	4	0	1,919
Michigan	119	552	777	20	4	1	3	2	0	0	5	16	6	4	0	1,709
Minnesota	10	92	527	182	4	0	2	0	12	0	0	8	11	2	3	853
Mississippi	1	16	0	2	0	0	0	0	0	0	0	0	0	0	0	19
Missouri	1	13	0	16	4	0	0	0	0	0	0	1	0	2	0	37
Montana	3	16	655	1,865	0	0	0	3	2	0	0	1	28	0	0	2,173
Nebraska	4	105	18	26	10	0	1	0	4	0	0	1	2	0	0	171
Nevada	837	957	8	22	7	16	2	0	0	1	0	11	2	0	0	958

[a]Includes (1) space cooling, (2) space cooling and heating, (3) space cooling and water heating, or (4) space cooling and heating and water heating.

Note: These numbers are based on firms reporting installations.

Source: Form EIA-701.

4. State Data (continued)

Table 17. Number of 1980 Active Solar Installations Classified by Application and State (continued)

State	Application															Total
	Single-family					Multifamily					Commercial					
	Pool Heating	Hot Water Only	Space Heating Only	Water & Space Heating	Other[a]	Pool Heating	Hot Water Only	Space Heating Only	Water & Space Heating	Other[a]	Pool Heating	Hot Water Only	Space Heating Only	Water & Space Heating	Other[a]	
New Hampshire	4	183	26	31	2	0	1	0	0	0	1	4	7	6	1	226
New Jersey	92	570	9	87	17	1	1	0	0	0	2	10	3	6	0	798
New Mexico	15	261	325	8	10	1	1	0	0	0	1	3	5	1	0	631
New York	185	2,057	40	84	553	0	123	0	1	0	2	27	4	0	3	3,079
North Carolina	7	380	9	112	0	0	0	0	2	0	0	15	0	3	0	528
North Dakota	0	4	41	0	0	0	1	0	0	0	0	0	10	0	0	56
Ohio	13	281	4	35	0	0	0	0	0	0	2	3	1	2	0	301
Oklahoma	90	188	2	69	19	0	1	0	0	0	1	6	1	2	5	380
Oregon	91	635	19	106	16	18	3	2	2	0	3	8	6	4	2	915
Pennsylvania	162	1,307	32	203	16	1	17	1	1	0	3	19	2	16	4	1,784
Puerto Rico	0	3,310	0	0	0	0	31	0	0	0	0	13	0	0	0	3,354
Rhode Island	48	440	11	13	4	0	8	0	0	0	0	6	0	0	0	530
South Carolina	5	49	1	12	0	0	0	0	0	0	1	6	0	3	1	78
South Dakota	12	62	120	21	3	0	0	0	1	0	0	4	8	6	0	245
Tennessee	5	657	11	13	1	0	1	0	0	0	0	3	6	1	0	698
Texas	562	588	17	100	53	3	3	0	0	2	6	9	2	6	13	1,329
Utah	11	65	4	58	2	0	1	0	0	0	1	0	1	1	0	140
Vermont	3	200	10	12	2	0	1	0	0	0	0	0	0	2	0	230
Virginia	10	583	11	58	1	0	7	0	0	0	0	1	5	1	0	673
Washington	239	95	48	90	22	8	1	0	1	0	7	2	3	0	0	511
West Virginia	3	7	0	3	7	0	0	0	0	0	0	2	0	0	0	22
Wisconsin	73	389	161	1,260	2	0	3	23	0	0	0	2	30	3	14	1,880
Wyoming	3	41	1,028	322	7	0	1	0	0	0	0	2	15	2	0	1,421
Other[b]	4	223	1	8	0	0	2	0	0	0	0	0	0	2	0	240
Total	25,106	90,569	8,358	6,558	1,620	793	1,188	38	245	65	283	512	205	186	89	91,692

[a]Includes (1) space cooling, (2) space cooling and heating, (3) space cooling and water heating, or (4) space cooling and heating and water heating.

[b]Includes installations in Alaska, Arkansas, and Virgin Islands plus all completed mail questionnaires given a special code because they were received without any State or company identification.

Note: These numbers are based on firms reporting installations.

Source: Form EIA-701.

Table 18. Average Sizes of 1980 Active Solar Installations Classified by Application and State (Square Feet)

State	Application														
	Single-family					Multifamily					Commercial				
	Pool Heating	Hot Water Only	Space Heating Only	Water & Space Heating	Other[a]	Pool Heating	Hot Water Only	Space Heating Only	Water & Space Heating	Other[a]	Pool Heating	Hot Water Only	Space Heating Only	Water & Space Heating	Other[a]
Alabama	432 (N=10)	69 (N=79)	Q	265 (N=31)	0	0	89 (N=5)	0	0	0	0	181 (N=4)	0	0	0
Arizona	489 (N= 618)	49 (N= 7,881)	190 (N=6)	262 (N= 221)	113 (N=10)	2,715 (N=18)	902 (N=13)	0	0	640 (N=4)	764 (N=21)	123 (N=86)	787 (N=3)	3,475 (N=4)	263 (N=5)
California	355 (N= 16,258)	71 (N= 13,571)	382 (N= 247)	1,651 (N= 679)	307 (N= 423)	722 (N= 391)	143 (N= 520)	0	289 (N= 196)	819 (N=58)	1,245 (N=77)	196 (N= 120)	282 (N=4)	918 (N=26)	1,368 (N=9)
Colorado	213 (N=41)	65 (N= 811)	187 (N=88)	213 (N= 278)	105 (N=32)	0	902 (N=32)	0	148 (N=7)	0	5,376 (N=5)	987 (N=3)	Q	927 (N=13)	0
Connecticut	420 (N=6)	82 (N= 1,048)	112 (N=13)	273 (N=49)	203 (N=11)	0	1,328 (N=5)	0	0	0	732 (N=4)	2,690 (N=6)	Q	550 (N=3)	0
Delaware	Q	57 (N=48)	0	253 (N=3)	0	0	Q	0	0	0	0	0	0	Q	0
District of Columbia	0	Q	Q	Q	0	0	0	0	0	0	0	0	0	0	0
Florida	405 (N= 4,985)	42 (N= 8,235)	17 (N= 1,819)	72 (N= 206)	74 (N=73)	1,805 (N= 335)	63 (N= 262)	0	Q	0	1,205 (N=95)	225 (N=99)	0	Q	209 (N=8)
Georgia	442 (N=28)	172 (N= 119)	728 (N=10)	200 (N= 104)	85 (N=3)	0	0	0	Q	0	0	909 (N=12)	Q	0	0
Hawaii	131 (N= 405)	62 (N= 2,379)	0	0	Q	0	99 (N=55)	0	0	0	0	460 (N=7)	0	0	0

[a]Includes (1) space cooling, (2) space cooling and heating, (3) space cooling and water heating, or (4) space cooling and heating and water heating.

Q = Data withheld because of a large variance.

Note: These are weighted averages. N equals only the number of actual installations for which respondents also reported the average size. Therefore, N does not equal the total of 93,692 installations reported in Table 7.

Source: Form EIA-791.

Table 18. Average Sizes of 1980 Active Solar Installations Classified by Application and State (Square Feet) (continued)

State	Application														
	Single-family					Multifamily					Commercial				
	Pool Heating	Hot Water Only	Space Heating Only	Water & Space Heating	Other[a]	Pool Heating	Hot Water Only	Space Heating Only	Water & Space Heating	Other[a]	Pool Heating	Hot Water Only	Space Heating Only	Water & Space Heating	Other[a]
Idaho	297 (N=10)	68 (N=93)	100 (N=39)	136 (N=56)	101 (N=4)	0	0	0	0	0	0	185 (N=1)	152 (N=12)	0	0
Illinois	382 (N= 128)	62 (N= 130)	702 (N= 103)	379 (N= 184)	385 (N=25)	0	0	0	335 (N=9)	0	0	209 (N=9)	600 (N=10)	353 (N=3)	3,000 (N=9)
Indiana	373 (N=10)	61 (N=69)	199 (N=13)	347 (N=45)	260 (N=8)	0	0	200 (N=1)	0	0	0	79 (N=9)	635 (N=3)	0	0
Iowa	162 (N=4)	65 (N=52)	160 (N=33)	338 (N=55)	375 (N=4)	0	0	0	0	0	0	122 (N=7)	1,653 (N=1)	0	0
Kansas	0	88 (N=48)	293 (N=5)	344 (N=69)	0	0	0	0	0	8,000 (N=8)	0	300 (N=1)	0	845 (N=4)	4,000 (N=5)
Kentucky	466 (N=3)	99 (N=25)	242 (N=1)	220 (N=13)	0	0	0	0	0	0	0	0	0	0	0
Louisiana	357 (N=26)	52 (N=42)	0	193 (N=6)	0	0	0	0	0	0	0	0	0	0	0
Maine	310 (N=12)	66 (N= 120)	187 (N=22)	191 (N=25)	59 (N=30)	0	264 (N=3)	0	600 (N=4)	0	0	386 (N=1)	281 (N=1)	0	0
Maryland	290 (N=28)	59 (N= 558)	133 (N=9)	295 (N=75)	239 (N=8)	0	0	0	0	0	0	216 (N=5)	0	0	0
Massachusetts	315 (N=53)	68 (N= 1,680)	328 (N=12)	259 (N= 119)	252 (N=14)	0	206 (N=28)	0	0	0	0	266 (N=8)	0	756 (N=4)	0
Michigan	329 (N= 349)	58 (N= 952)	131 (N= 777)	428 (N=20)	59 (N=4)	0	0	0	0	0	808 (N=5)	199 (N=16)	130 (N=6)	10,333 (N=1)	0
Minnesota	217 (N=10)	59 (N=97)	191 (N= 527)	217 (N= 192)	589 (N=4)	0	0	0	190 (N=12)	0	0	93 (N=8)	132 (N=11)	0	32 (N=1)

[a]Includes (1) space cooling, (2) space cooling and heating, (3) space cooling and water heating, or (4) space cooling and heating and water heating.

Q = Data withheld because of a large variance.

Note: These are weighted averages. N equals only the number of actual installations for which respondents also reported the average size. Therefore, N does not equal the total of 93,692 installations reported in Table 7.

Source: Form EIA-701.

Table 18. Average Sizes of 1980 Active Solar Installations Classified by Application and State (Square Feet) (continued)

State	Application														
	Single-family					Multifamily					Commercial				
	Pool Heating	Hot Water Only	Space Heating Only	Water & Space Heating	Other[a]	Pool Heating	Hot Water Only	Space Heating Only	Water & Space Heating	Other[a]	Pool Heating	Hot Water Only	Space Heating Only	Water & Space Heating	Oth
Mississippi	Q	56 (N=15)	0	Q	0	0	0	0	0	0	0	0	0	0	
Missouri	Q	55 (N=13)	0	163 (N=16)	420 (N=4)	0	0	0	0	0	0	Q	0	Q	
Montana	180 (N=3)	50 (N=16)	58 (N= 655)	52 (N= 1,465)	0	0	0	52 (N=3)	Q	0	0	Q	302 (N=28)	0	
Nebraska	575 (N=4)	73 (N= 105)	238 (N=19)	255 (N=26)	Q	0	Q	0	1,250 (N=4)	0	0	Q	Q	0	
Nevada	389 (N= 432)	53 (N= 947)	165 (N=4)	319 (N=22)	159 (N=7)	750 (N=16)	Q	0	Q	Q	0	701 (N=11)	Q	0	
New Hampshire	322 (N=4)	101 (N= 102)	229 (N=25)	389 (N=31)	Q	0	Q	0	0	0	Q	93 (N=4)	271 (N=7)	776 (N=6)	
New Jersey	404 (N=92)	65 (N= 569)	378 (N=9)	298 (N=87)	80 (N=5)	Q	Q	0	0	0	Q	618 (N=10)	1,373 (N=3)	395 (N=6)	
New Mexico	305 (N=15)	69 (N= 261)	71 (N= 325)	282 (N=8)	90 (N=10)	Q	Q	0	0	0	Q	335 (N=3)	Q	0	
New York	376 (N= 185)	66 (N= 2,055)	230 (N=40)	329 (N=89)	99 (N= 561)	0	239 (N= 123)	0	Q	0	Q	219 (N=26)	215 (N=4)	0	3 (N
North Carolina	2,279 (N=7)	61 (N= 380)	1,358 (N=9)	323 (N= 112)	0	0	0	0	Q	0	0	1,073 (N=15)	0	258 (N=3)	
North Dakota	0	60 (N=4)	106 (N=41)	0	0	0	Q	0	0	0	0	0	187 (N=10)	0	

[a]Includes (1) space cooling, (2) space cooling and heating, (3) space cooling and water heating, or (4) space cooling and heating and water heati

Q = Data withheld because of a large variance.

Note: These are weighted averages. N equals only the number of actual installations for which respondents also reported the average size. Therefore, N does not equal the total of 93,692 installations reported in Table 7.

Source: Form EIA-701.

Table 18. Average Sizes of 1980 Active Solar Installations Classified by Application and State (Square Feet) (continued)

State	Application														
	Single-family					Multifamily					Commercial				
	Pool Heating	Hot Water Only	Space Heating Only	Water & Space Heating	Other[a]	Pool Heating	Hot Water Only	Space Heating Only	Water & Space Heating	Other[a]	Pool Heating	Hot Water Only	Space Heating Only	Water & Space Heating	Other[a]
Ohio	1,014 (N=13)	40 (N= 240)	132 (N=4)	182 (N=32)	0	0	0	0	0	0	0	110 (N=3)	0	0	0
Oklahoma	360 (N=90)	84 (N= 199)	0	196 (N=69)	160 (N=18)	0	0	0	0	0	0	135 (N=6)	0	0	256 (N=5)
Oregon	229 (N=83)	67 (N= 635)	211 (N=19)	279 (N= 102)	0	847 (N=18)	233 (N=3)	0	0	0	1,693 (N=3)	114 (N=8)	366 (N=5)	380 (N=4)	0
Pennsylvania	401 (N= 161)	67 (N= 1,284)	261 (N=32)	254 (N= 202)	349 (N=18)	0	164 (N=8)	0	0	0	348 (N=3)	205 (N=17)	0	951 (N=16)	0
Puerto Rico	0	46 (N= 3,310)	0	0	0	0	93 (N=31)	0	0	0	0	989 (N=13)	0	0	0
Rhode Island	291 (N=68)	63 (N= 990)	336 (N=11)	290 (N=13)	232 (N=4)	0	105 (N=8)	0	0	0	0	66 (N=6)	0	0	0
South Carolina	368 (N=5)	65 (N=99)	0	215 (N=12)	0	0	0	0	0	0	0	1,378 (N=6)	0	905 (N=3)	0
South Dakota	312 (N=12)	99 (N=62)	51 (N= 127)	221 (N=19)	966 (N=3)	0	0	0	0	0	0	300 (N=4)	142 (N=8)	597 (N=6)	0
Tennessee	368 (N=5)	63 (N= 656)	411 (N=11)	827 (N=13)	0	0	0	0	0	0	0	159 (N=3)	1,843 (N=6)	0	0
Texas	428 (N= 562)	63 (N= 598)	129 (N=17)	131 (N= 100)	163 (N=54)	600 (N=3)	150 (N=3)	0	0	0	733 (N=6)	870 (N=9)	0	1,973 (N=6)	19,795 (N=12)

[a]Includes (1) space cooling, (2) space cooling and heating; (3) space cooling and water heating, or (4) space cooling and heating and water heating.

0 = Data withheld because of a large variance.

Note: These are weighted averages. N equals only the number of actual installations for which respondents also reported the average size. Therefore, N does not equal the total of 93,692 installations reported in Table 7.

Source: Form EIA-701.

Table 18. Average Sizes of 1980 Active Solar Installations Classified by Application and State (Square Feet) (continued)

State	Application														
	Single-family					Multifamily					Commercial				
	Pool Heating	Hot Water Only	Space Heating Only	Water & Space Heating	Other[a]	Pool Heating	Hot Water Only	Space Heating Only	Water & Space Heating	Other[a]	Pool Heating	Hot Water Only	Space Heating Only	Water & Space Heating	Other[a]
Utah	350 (N=11)	58 (N=65)	68 (N=4)	136 (N=58)	Q	0	Q	0	0	0	Q	0	0	Q	0
Vermont	300 (N=3)	70 (N= 150)	168 (N=10)	231 (N=12)	Q	0	Q	0	0	0	0	0	0	0	0
Virginia	388 (N=10)	67 (N= 571)	192 (N=11)	248 (N=58)	Q	0	191 (N=7)	0	0	0	0	Q	404 (N=8)	Q	0
Washington	388 (N= 238)	71 (N=95)	89 (N=88)	205 (N=90)	208 (N=22)	578 (N=8)	Q	0	Q	0	1,407 (N=7)	Q	Q	0	0
West Virginia	335 (N=3)	55 (N=7)	0	280 (N=3)	58 (N=7)	0	0	0	0	0	0	Q	0	0	0
Wisconsin	320 (N=73)	62 (N= 309)	305 (N= 157)	341 (N= 1,258)	Q	0	736 (N=3)	95 (N=23)	0	0	0	Q	282 (N=29)	718 (N=3)	292 (N=19)
Wyoming	393 (N=3)	89 (N=41)	283 (N= 1,020)	111 (N= 322)	127 (N=7)	0	Q	0	0	0	0	Q	385 (N=15)	0	0
Other[b]	247 (N=8)	88 (N=109)	128 (N=5)	296 (N=9)	187 (N=16)	707 (N=3)	291 (N=22)	587 (N=5)	1,416 (N=13)	3,167 (N=3)	868 (N=16)	212 (N=16)	3,103 (N=23)	1,928 (N=29)	1,302 (N=10)
Average	357	59	186	358	162	888	193	167	360	1,800	1,208	338	702	1,185	3,108
Based On Total Number of Cases	25,015	50,304	6,332	6,515	1,389	792	1,131	34	245	65	242	488	197	142	83

[a]Includes (1) space cooling, (2) space cooling and heating, (3) space cooling and water heating, or (4) space cooling and heating and water heating.

[b]Includes installations in Alaska, Arkansas, and the Virgin Islands and averages suppressed because of an unacceptably large variance (Q).

Q = Data withheld because of a large variance.

Note: These are weighted averages. N equals only the number of actual installations for which respondents also reported the average size. Therefore, N does not equal the total of 93,692 installations reported in Table 7.

Source: Form EIA-701.

Table 19. Average Total Costs of 1980 Active Solar Installations Classified by Application and State (Dollars)

State	Application														
	Single-family					Multifamily					Commercial				
	Pool Heating	Hot Water Only	Space Heating Only	Water & Space Heating	Other[a]	Pool Heating	Hot Water Only	Space Heating Only	Water & Space Heating	Other[a]	Pool Heating	Hot Water Only	Space Heating Only	Water & Space Heating	Other[a]
Alabama	3,960 (N=10)	3,111 (N=79)	0	9,561 (N=31)	0	0	3,880 (N=5)	0	0	0	0	5,200 (N=9)	0	0	0
Arizona	3,719 (N= 633)	2,950 (N= 7,881)	5,916 (N=6)	10,017 (N= 221)	3,670 (N=10)	6,190 (N=18)	4,761 (N=13)	0	0	7,500 (N=4)	19,928 (N=21)	5,541 (N=46)	21,666 (N=3)	256,999 (N=9)	108,512 (N=8)
California	3,600 (N= 16,243)	3,346 (N= 13,374)	3,240 (N= 247)	8,851 (N= 850)	4,278 (N= 625)	7,969 (N= 391)	4,468 (N= 520)	0	8,005 (N= 196)	3,962 (N=50)	16,457 (N=77)	6,731 (N= 117)	11,000 (N=4)	29,203 (N=27)	135,775 (N=8)
Colorado	11,069 (N=31)	3,667 (N= 811)	9,028 (N=48)	9,516 (N= 218)	5,363 (N=33)	0	5,890 (N=32)	0	5,500 (N=7)	0	63,900 (N=5)	27,833 (N=3)	0	36,769 (N=13)	0
Connecticut	2,933 (N=6)	3,604 (N= 1,048)	5,846 (N=13)	11,108 (N=49)	12,681 (N=11)	0	55,737 (N=4)	0	0	0	39,500 (N=4)	137,866 (N=6)	0	133,333 (N=1)	0
Delaware	0	2,797 (N=48)	0	10,666 (N=3)	0	0	0	0	0	0	0	0	0	0	0
District of Columbia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Florida	2,647 (N= 4,965)	1,847 (N= 8,038)	4,468 (N=19)	2,908 (N= 206)	2,235 (N=53)	5,673 (N= 335)	2,549 (N= 261)	0	0	0	7,143 (N=96)	6,185 (N=57)	0	0	9,417 (N=8)
Georgia	3,303 (N=28)	2,667 (N= 119)	5,650 (N=10)	5,970 (N= 101)	6,000 (N=3)	0	0	0	0	0	0	18,847 (N=17)	0	0	0
Hawaii	3,771 (N= 405)	3,603 (N= 2,379)	0	0	1,295 (N=3)	0	8,467 (N=55)	0	0	0	0	15,857 (N=7)	0	0	0

[a]Includes (1) space cooling, (2) space cooling and heating, (3) space cooling and water heating, or (4) space cooling and heating and water heating.

0 = Data withheld because of a large variance.

Note: These are weighted averages. N equals only the number of actual installations for which respondents also reported the average size. Therefore, N does not equal the total of 93,692 installations reported in Table 7.

Source: Form EIA-701.

Table 19. Average Total Costs of 1980 Active Solar Installations Classified by Application and State (Dollars) (continued)

State	Application														
	Single-family					Multifamily					Commercial				
	Pool Heating	Hot Water Only	Space Heating Only	Water & Space Heating	Other[a]	Pool Heating	Hot Water Only	Space Heating Only	Water & Space Heating	Other[a]	Pool Heating	Hot Water Only	Space Heating Only	Water & Space Heating	Other[a]
Idaho	5,180 (N=10)	3,450 (N=43)	8,501 (N=39)	7,189 (N=56)	5,061 (N=4)	0	0	0	0	0	0	8,257 (N=3)	7,627 (N=11)	0	0
Illinois	3,580 (N= 128)	2,939 (N= 130)	12,124 (N= 103)	10,632 (N= 104)	6,360 (N=25)	0	0	0	17,111 (N=9)	0	0	10,266 (N=9)	18,985 (N=10)	33,533 (N=3)	3,500 (N=9)
Indiana	2,430 (N=10)	3,043 (N=69)	8,615 (N=13)	13,995 (N=49)	7,875 (N=8)	0	0	5,500 (N=3)	0	0	0	1,800 (N=9)	19,833 (N=3)	0	0
Iowa	955 (N=4)	2,703 (N=52)	8,371 (N=33)	10,168 (N=55)	7,925 (N=4)	0	0	0	0	0	0	4,028 (N=7)	12,733 (N=3)	0	0
Kansas	0	3,350 (N=48)	5,900 (N=5)	7,376 (N=69)	0	0	0	0	0	350,000 (N=8)	0	11,500 (N=3)	0	26,675 (N=4)	175,000 (N=5)
Kentucky	2,733 (N=3)	1,839 (N=25)	9,200 (N=3)	3,981 (N=13)	0	0	0	0	0	0	0	0	0	0	0
Louisiana	2,878 (N=26)	2,902 (N=42)	0	8,583 (N=6)	0	0	0	0	0	0	0	0	0	0	0
Maine	3,883 (N=12)	3,535 (N= 120)	8,491 (N=23)	7,948 (N=25)	2,123 (N=30)	0	9,000 (N=3)	0	20,000 (N=4)	0	0	0	6,010 (N=3)	0	0
Maryland	5,810 (N=28)	3,196 (N= 558)	6,555 (N=9)	11,213 (N=75)	7,925 (N=8)	0	0	0	0	0	0	6,340 (N=5)	0	0	0
Massachusetts	2,773 (N=53)	3,950 (N= 1,680)	8,066 (N=12)	7,579 (N= 116)	6,428 (N=14)	0	8,910 (N=28)	0	0	0	0	8,312 (N=8)	0	47,250 (N=4)	0
Michigan	2,513 (N= 319)	3,052 (N= 452)	2,217 (N= 777)	9,711 (N=18)	8,100 (N=4)	0	0	0	0	0	3,800 (N=5)	8,925 (N=16)	2,000 (N=6)	36,333 (N=3)	0

[a]Includes (1) space cooling, (2) space cooling and heating, (3) space cooling and water heating, or (4) space cooling and heating and water heating.

0 = Data withheld because of a large variance.

Note: These are weighted averages. N equals only the number of actual installations for which respondents also reported the average size. Therefore, N does not equal the total of 93,692 installations reported in Table 7.

Source: Form EIA-701.

Table 19. Average Total Costs of 1980 Active Solar Installations Classified by Application and State (Dollars) (continued)

State	Application														
	Single-Family					Multifamily					Commercial				
	Pool Heating	Hot Water Only	Space Heating Only	Water & Space Heating	Other[a]	Pool Heating	Hot Water Only	Space Heating Only	Water & Space Heating	Other[a]	Pool Heating	Hot Water Only	Space Heating Only	Water & Space Heating	Other[a]
Minnesota	11,000 (N=10)	3,339 (N=90)	2,155 (N= 527)	6,071 (N= 142)	6,625 (N=9)	0	0	0	9,000 (N=12)	0	0	3,800 (N=8)	8,363 (N=11)	0	1,000 (N=3)
Mississippi	0	2,760 (N=15)	0	0	0	0	0	0	0	0	0	0	0	0	0
Missouri	0	3,521 (N=13)	0	6,163 (N=16)	10,290 (N=9)	0	0	0	0	0	0	0	0	0	0
Montana	6,000 (N=3)	3,100 (N=16)	3,676 (N= 655)	8,739 (N= 1,465)	0	0	0	3,500 (N=3)	0	0	0	0	5,110 (N=28)	0	0
Nebraska	3,125 (N=4)	2,806 (N= 108)	4,307 (N=14)	9,221 (N=26)	10,120 (N=10)	0	0	0	36,750 (N=4)	0	0	0	0	0	0
Nevada	2,903 (N= 432)	3,005 (N= 457)	5,300 (N=4)	10,722 (N=22)	0	5,906 (N=16)	0	0	0	0	0	22,000 (N=11)	0	0	0
New Hampshire	2,675 (N=4)	3,581 (N= 143)	8,793 (N=26)	10,498 (N=31)	0	0	0	0	0	0	0	5,850 (N=4)	6,738 (N=7)	10,800 (N=6)	0
New Jersey	3,073 (N=85)	3,158 (N= 554)	8,250 (N=8)	9,986 (N=86)	3,500 (N=15)	0	0	0	0	0	0	99,650 (N=8)	99,333 (N=3)	14,166 (N=6)	0
New Mexico	3,465 (N=14)	3,282 (N= 257)	2,204 (N= 325)	8,785 (N=7)	3,500 (N=10)	0	0	0	0	0	0	0	0	0	0
New York	3,127 (N= 183)	3,357 (N= 1,756)	9,972 (N=40)	13,438 (N=84)	2,008 (N= 562)	0	10,538 (N= 123)	0	0	0	0	11,074 (N=27)	7,133 (N=3)	0	13,200 (N=3)

[a]Includes (1) space cooling, (2) space cooling and heating, (3) space cooling and water heating, or (4) space cooling and heating and water heating.

0 = Data withheld because of a large variance.

Note: These are weighted averages. N equals only the number of actual installations for which respondents also reported the average size. Therefore, N does not equal the total of 93,692 installations reported in Table 7.

Source: Form EIA-701.

Table 19. Average Total Costs of 1980 Active Solar Installations Classified by Application and State (dollars) (continued)

State	Application														
	Single-family					Multifamily					Commercial				
	Pool Heating	Hot Water Only	Space Heating Only	Water & Space Heating	Other[a]	Pool Heating	Hot Water Only	Space Heating Only	Water & Space Heating	Other[a]	Pool Heating	Hot Water Only	Space Heating Only	Water & Space Heating	Other[a]
North Carolina	5,319 (N=7)	2,977 (N= 380)	11,048 (N=9)	8,090 (N= 112)	0	0	0	0	0	0	0	42,439 (N=15)	0	7,733 (N=3)	0
North Dakota	0	2,675 (N=9)	3,919 (N=41)	0	0	0	0	0	0	0	0	0	10,500 (N=10)	0	0
Ohio	7,438 (N=13)	2,302 (N= 241)	7,550 (N=4)	9,318 (N=35)	0	0	0	0	0	0	0	10,333 (N=3)	0	0	0
Oklahoma	3,395 (N=82)	3,981 (N= 194)	0	10,188 (N=69)	10,294 (N=19)	0	0	0	0	0	0	0	0	0	8,640 (N=5)
Oregon	3,278 (N=91)	3,262 (N= 635)	5,978 (N=19)	10,891 (N= 106)	0	6,038 (N=18)	8,133 (N=3)	0	0	0	13,166 (N=3)	8,662 (N=8)	23,333 (N=6)	17,646 (N=9)	0
Pennsylvania	3,394 (N= 152)	3,818 (N= 1,307)	9,271 (N=32)	9,070 (N= 203)	5,872 (N=29)	0	8,500 (N=17)	0	0	0	10,000 (N=3)	8,289 (N=19)	0	15,687 (N=16)	0
Puerto Rico	0	1,108 (N= 3,310)	0	0	0	0	3,741 (N=31)	0	0	0	0	8,133 (N=13)	0	0	0
Rhode Island	2,562 (N=88)	3,497 (N= 490)	8,063 (N=11)	11,000 (N=13)	9,125 (N=4)	0	6,025 (N=8)	0	0	0	0	8,033 (N=6)	0	0	0
South Carolina	3,720 (N=5)	2,727 (N=49)	0	8,833 (N=12)	0	0	0	0	0	0	0	49,583 (N=6)	0	17,166 (N=3)	0
South Dakota	2,750 (N=12)	2,703 (N=61)	1,855 (N= 127)	8,621 (N=19)	8,666 (N=3)	0	0	0	0	0	0	11,000 (N=4)	3,975 (N=8)	27,750 (N=6)	0
Tennessee	2,580 (N=5)	2,770 (N= 657)	5,045 (N=11)	8,036 (N=13)	0	0	0	0	0	0	0	0	0	0	0

[a]Includes (1) space cooling, (2) space cooling and heating, (3) space cooling and water heating, or (4) space cooling and heating and water heating.

0 = Data withheld because of a large variance.

Note: These are weighted averages. N equals only the number of actual installations for which respondents also reported the average size. Therefore, N does not equal the total of 93,692 installations reported in Table 7.

Source: Form EIA-701.

Table 19. Average Total Costs of 1980 Active Solar Installations Classified by Application and State (dollars) (continued)

State	Application														
	Single-Family					Multifamily					Commercial				
	Pool Heating	Hot Water Only	Space Heating Only	Water & Space Heating	Other[a]	Pool Heating	Hot Water Only	Space Heating Only	Water & Space Heating	Other[a]	Pool Heating	Hot Water Only	Space Heating Only	Water & Space Heating	Other[a]
Texas	3,351 (N=548)	2,798 (N=829)	3,881 (N=17)	8,626 (N=100)	7,725 (N=48)	8,000 (N=3)	6,000 (N=3)	0	0	0	5,223 (N=6)	18,712 (N=7)	0	77,000 (N=6)	916,285 (N=7)
Utah	3,500 (N=11)	3,035 (N=65)	3,500 (N=4)	8,138 (N=54)	0	0	0	0	0	0	0	0	0	0	0
Vermont	2,666 (N=3)	3,589 (N=200)	8,680 (N=10)	8,591 (N=12)	0	0	0	0	0	0	0	0	0	0	0
Virginia	3,270 (N=10)	3,525 (N=581)	8,032 (N=11)	9,862 (N=54)	0	0	9,300 (N=7)	0	0	0	0	0	19,040 (N=5)	0	0
Washington	3,698 (N=239)	3,050 (N=95)	3,941 (N=48)	7,728 (N=90)	5,818 (N=22)	3,906 (N=8)	0	0	0	0	28,833 (N=6)	0	39,333 (N=3)	0	0
West Virginia	1,250 (N=3)	2,719 (N=7)	0	8,000 (N=3)	2,000 (N=7)	0	0	0	0	0	0	0	0	0	0
Wisconsin	3,195 (N=73)	3,168 (N=301)	3,196 (N=151)	10,886 (N=1,295)	0	0	39,000 (N=3)	1,356 (N=23)	0	0	0	0	5,430 (N=30)	23,333 (N=3)	5,485 (N=14)
Wyoming	12,000 (N=3)	3,663 (N=39)	3,497 (N=1,027)	6,331 (N=322)	2,321 (N=7)	0	0	0	0	0	0	0	8,550 (N=14)	0	0
Other[b]	1,827 (N=8)	2,029 (N=9)	8,138 (N=5)	11,033 (N=9)	6,807 (N=15)	5,219 (N=4)	10,036 (N=21)	7,300 (N=5)	27,400 (N=14)	60,000 (N=1)	13,198 (N=16)	9,505 (N=21)	18,103 (N=23)	87,776 (N=29)	58,180 (N=10)
Average	3,379	2,893	3,589	8,079	3,823	6,803	5,713	2,785	11,097	49,018	13,377	11,979	10,932	47,919	125,283
Based On Total Number of Cases	24,979	49,455	9,486	6,470	1,586	793	1,137	39	246	63	242	477	199	143	80

[a]Includes (1) space cooling, (2) space cooling and heating, (3) space cooling and water heating, or (4) space cooling and heating and water heating.

[b]Includes installations in Alaska, Arkansas, and the Virgin Islands and averages suppressed because of an unacceptably large variance(0).

0 = Data withheld because of a large variance.

Note: These are weighted averages. N equals only the number of actual installations for which respondents also reported the average size. Therefore, N does not equal the total of 93,692 installations reported in Table 7.

Source: Form EIA-701.

4. State Data (continued)

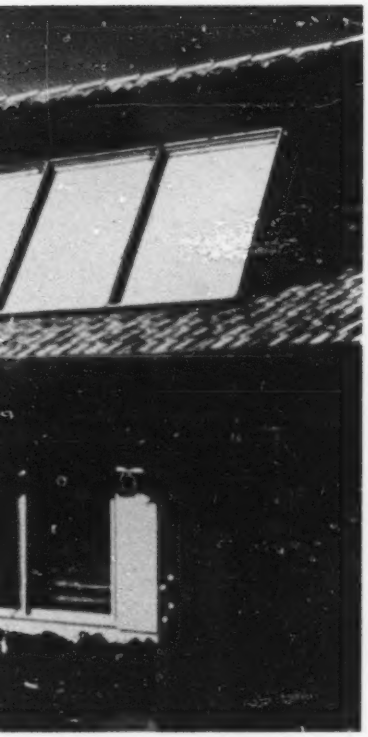
Table 20. Number of 1980 Survey Respondents and Active Solar Installers by State

State	Total Number of Respondents	Total Number of Installers
Alabama	60	11
Arizona	52	36
California	331	218
Colorado	76	52
Connecticut	52	33
Delaware	20	8
District of Columbia	9	3
Florida	391	226
Georgia	50	20
Hawaii	23	15
Idaho	39	18
Illinois	146	59
Indiana	66	29
Iowa	33	16
Kansas	32	18
Kentucky	22	12
Louisiana	29	8
Maine	50	26
Maryland	72	25
Massachusetts	66	55
Michigan	60	33
Minnesota	109	44
Mississippi	16	3
Missouri	46	7
Montana	25	10
Nebraska	45	17
Nevada	20	16
New Hampshire	46	32

Note: Mailing addresses and telephone area codes were cross-checked to classify respondents by State.

Source: Form EIA-701

Table 20. Number of 1980 Survey Respondents and Active Solar Installers by State (continued)



State	Total Number of Respondents	Total Number of Installers
New Jersey	114	72
New Mexico	25	16
New York	129	74
North Carolina	61	30
North Dakota	7	5
Ohio	56	24
Oklahoma	38	14
Oregon	119	64
Pennsylvania	214	92
Puerto Rico	9	9
Rhode Island	20	13
South Carolina	24	11
South Dakota	36	26
Tennessee	64	21
Texas	160	59
Utah	13	7
Vermont	24	18
Virginia	74	40
Washington	43	22
West Virginia	13	4
Wisconsin	108	55
Wyoming	57	21
Other[a]	43	14
Total	3,437	1,761

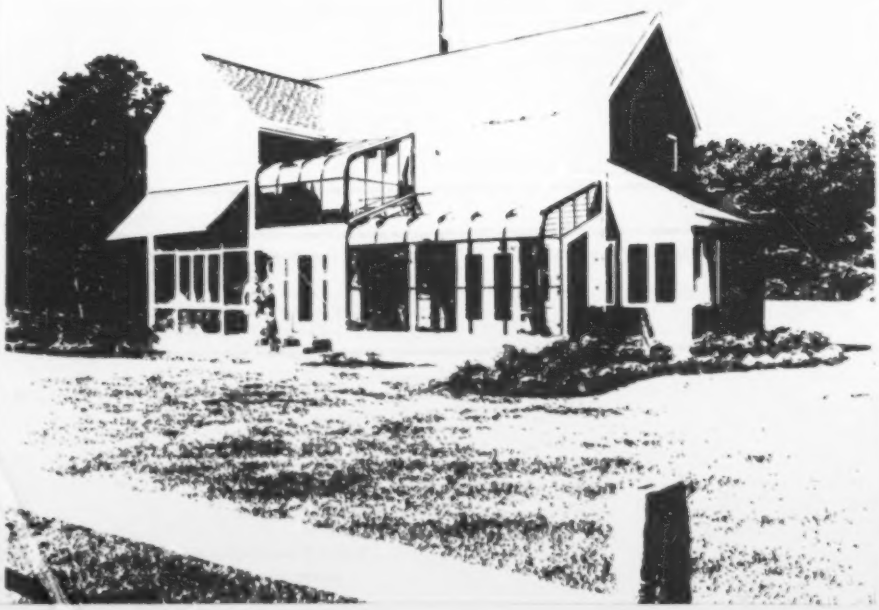
[a]Includes Alaska, Arkansas, and the Virgin Islands plus all completed mail questionnaires given a special code because they were received without any State or company identification.

Note: Mailing addresses and telephone area codes were cross-checked to classify respondents by State.

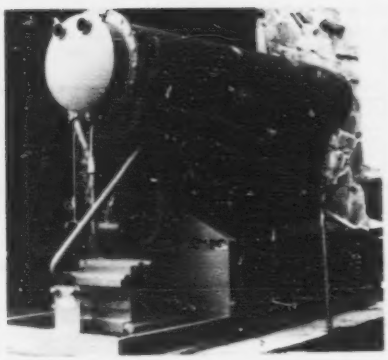
Source: Form EIA-701

ppendix

Survey Questionnaire



Survey Questionaire



Opinion Research Corporation
Princeton, New Jersey

51658
April 1981

OMB No. 1904-0023
Approval Expires: 3/31/82

U.S. DEPARTMENT OF ENERGY
ACTIVE SOLAR INSTALLATIONS SURVEY
GENERAL INSTRUCTIONS

This questionnaire deals with active solar energy systems. An active solar energy system is one that requires external mechanical power to move the collected heat. For purposes of this survey, "active" includes thermosyphon systems.

- For most questions, simply put an X in the box next to your answer. Pay no attention to the little numbers next to the boxes; they are for computer processing only.
- For a few questions, you will be asked to write in your answer. Please write clearly and legibly, giving as much detail as you can.
- Depending upon your responses to some questions, you will be asked to go on to the next question or to skip ahead to a particular question. By skipping to the specified question, you will avoid questions which do not pertain to you.
- Read each question carefully and answer it as accurately as you can.
- If you have any questions or have trouble completing the questionnaire, call Opinion Research Corporation, station-to-station, collect (609) 924-5900, ext. 254, between 9 a.m. and 5 p.m. Eastern Standard Time, Monday through Friday.

When you have completed the questionnaire, place it in the postage-paid return envelope provided and mail it directly to Opinion Research Corporation.

Data on this voluntary survey are being collected under the authority of the Department of Energy Organization Act, (P.L. 95-91) and the Federal Energy Administration Act, (P.L. 93-275). See attachment for provisions regarding confidentiality.

Thank you.

1. During Calendar Year (CY) 1980, were you involved in any aspect of the active solar energy business?

CHECK ONE

1 ☐ Yes → GO ON TO QUESTION 2

2 ☐ No → SKIP TO QUESTION 10

2. What areas of the solar energy business were you involved in during CY 1980?

CHECK AS MANY AS APPLY

1 ☐ Manufacturer of Active Solar Equipment
2 ☐ Distributor of Active Solar Equipment
3 ☐ Dealer in Active Solar Equipment
4 ☐ Installer of Active Solar Equipment
5 ☐ Designer
6 ☐ Homebuilder
7 ☐ Architect
8 ☐ Other (Please specify): _____

3. About what percentage of your gross business in CY 1980 was derived from sales of active solar energy systems?

RECORD ACTUAL PERCENTAGE OR BEST ESTIMATE _____ %

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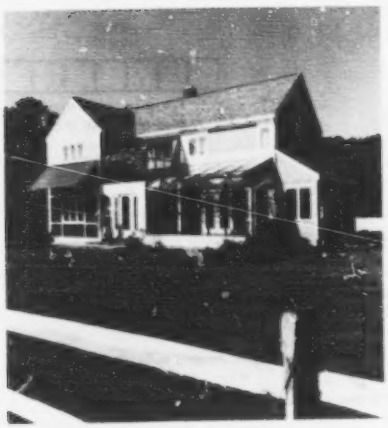
GO ON TO QUESTION 4

Survey Questionaire (continued)



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4. Have you done any actual **installations** of active solar energy systems during CY 1980? (If you were only involved in completing hook-ups for systems which someone else installed, please answer "No" to this question.)

CHECK ONE

1 ☐ Yes → GO ON TO QUESTION 5

2 ☐ No → SKIP TO QUESTION 10

Now, a few questions about the active solar energy systems you installed during 1980.

5. What percentage of your active solar installations during CY 1980 involved...

RECORD ACTUAL PERCENTAGE OR BEST ESTIMATE FOR EACH

a. Manufactured or prefabricated collectors (delivered ready for installation)? _____%

b. Site-built collectors (built or fabricated at the construction site)? _____%

TOTAL 100 %

6. During CY 1980, did you install any active solar energy systems in **single-family residences**? (Note: A single- family residence has a system for heating, cooling, or both heating and cooling, and contains at least one, but not more than four, dwelling units.)

CHECK ONE

1 ☐ Yes → GO ON TO QUESTION 6A

2 ☐ No → SKIP TO QUESTION 7

6A. For **each type** of active solar installation you made in **single-family residences** in CY 1980, please estimate the **number** of systems you installed, the **average size** in square feet of collector area per installation, and the average **cost** to the consumer (including system and installation costs).

TYPE OF USE	NUMBER OF SYSTEMS INSTALLED IN 1980	AVERAGE SIZE (SQUARE FEET OF COLLECTOR AREA) PER INSTALLATION	AVERAGE TOTAL COST PER INSTALLATION
Pool heating			
Hot water only			
Space heating only			
Combined space heating and hot water			
Other (Specify) _____			

GO ON TO QUESTION 6B

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Survey Questionaire (continued)

IF YOU INSTALLED ANY ACTIVE SOLAR SYSTEMS IN SINGLE-FAMILY RESIDENCES DURING CY 1980 EXCLUSIVELY FOR HOT WATER USE, ANSWER QUESTION 6B. **OTHERWISE, SKIP TO QUESTION 7.**

6B. For hot-water-only installations in **single-family residences** during CY 1980, how many were installed in existing buildings, and how many were installed in new buildings? For each type of installation, **please estimate the number** of systems you installed, the average **size** in square feet of collector area per installation, and the average **cost** to the consumer (including system and installation costs).

BUILDING TYPE	NUMBER OF SYSTEMS INSTALLED IN 1980	AVERAGE SIZE (SQUARE FEET OF COLLECTOR AREA) PER INSTALLATION	AVERAGE TOTAL COST PER INSTALLATION
Existing buildings			
New buildings			

7. During CY 1980, did you install any active solar energy systems in multi-family residences, apartments, or townhouses? (Note: A **multi-family residence** contains five or more dwelling units and a central heating or central cooling system, or both.)

CHECK ONE

1 ☐ Yes → GO ON TO QUESTION 7A

2 ☐ No → SKIP TO QUESTION 8

7A. For **each type** of active solar installation you made in **multi-family residences** in CY 1980, please estimate the **number** of systems you installed, the average **size** in square feet of collector area per installation, and the average **cost** to the consumer (including system and installation costs).

TYPE OF USE	NUMBER OF SYSTEMS INSTALLED IN 1980	AVERAGE SIZE (SQUARE FEET OF COLLECTOR AREA) PER INSTALLATION	AVERAGE TOTAL COST PER INSTALLATION
Pool heating			
Hot water only			
Space heating only			
Combined space heating and hot water			
Other (Specify) _____			

8. During CY 1980, did you install any active solar energy systems in **commercial buildings** (including retail, wholesale, office, institutional, and industrial buildings)?

CHECK ONE

1 ☐ Yes → GO ON TO QUESTION 8A

2 ☐ No → SKIP TO QUESTION 9

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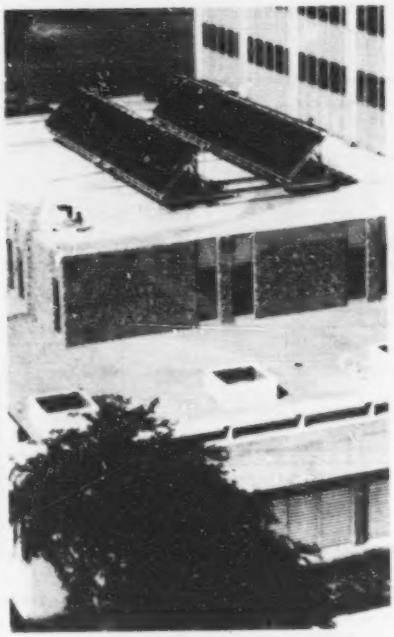
Survey Questionaire (continued)



8A. For each type of active solar installation you made in **commercial buildings** in CY 1980, please estimate the **number** of systems you installed, the average **size** in square feet of collector area per installation, and the average **cost** to the consumer (including system and installation costs).

TYPE OF USE	NUMBER OF SYSTEMS INSTALLED IN 1980	AVERAGE SIZE (SQUARE FEET OF COLLECTOR AREA) PER INSTALLATION	AVERAGE TOTAL COST PER INSTALLATION
Pool heating			
Hot water only			
Space heating only			
Combined space heating and hot water			
Other (Specify) _____ _____			

Note: Record "industrial" and "agricultural" applications under "Other" category, specifying what the application was.

Now, a question on the geographic distribution of your active solar installations to help us compile statewide totals.

9. Please indicate in which states the active solar systems you installed during CY 1980 are located, and indicate the number of such systems you installed in each of the states you check.

	NUMBER OF INSTALLATIONS IN CY 1980		NUMBER OF INSTALLATIONS IN CY 1980		NUMBER OF INSTALLATIONS IN CY 1980
01 ☐ Alaska		18 ☐ Kentucky		36 ☐ Ohio	
02 ☐ Alabama		19 ☐ Louisiana		37 ☐ Oklahoma	
03 ☐ Arizona		20 ☐ Maine		38 ☐ Oregon	
04 ☐ Arkansas		21 ☐ Maryland		39 ☐ Pennsylvania	
05 ☐ California		22 ☐ Massachusetts		40 ☐ Puerto Rico	
06 ☐ Colorado		23 ☐ Michigan		41 ☐ Rhode Island	
07 ☐ Connecticut		24 ☐ Minnesota		42 ☐ South Carolina	
08 ☐ Delaware		25 ☐ Mississippi		43 ☐ South Dakota	
09 ☐ District of Columbia		26 ☐ Missouri		44 ☐ Tennessee	
10 ☐ Florida		27 ☐ Montana		45 ☐ Texas	
11 ☐ Georgia		28 ☐ Nebraska		46 ☐ Utah	
12 ☐ Hawaii		29 ☐ Nevada		47 ☐ Vermont	
13 ☐ Idaho		30 ☐ New Hampshire		48 ☐ Virgin Islands (U.S.)	
14 ☐ Illinois		31 ☐ New Jersey		49 ☐ Virginia	
15 ☐ Indiana		32 ☐ New Mexico		50 ☐ Washington	
16 ☐ Iowa		33 ☐ New York		51 ☐ West Virginia	
17 ☐ Kansas		34 ☐ North Carolina		52 ☐ Wisconsin	
		35 ☐ North Dakota		53 ☐ Wyoming	

GO ON TO QUESTION 10

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Survey Questionaire (continued)

10. Prior to CY 1980, were you ever involved in installing active solar energy systems in buildings?

CHECK ONE

1 ☐ Yes → GO ON TO QUESTION 11

2 ☐ No → SKIP TO QUESTION 14

11. For how many years prior to CY 1980 were you involved in installing active solar energy systems in buildings?

RECORD ACTUAL NUMBER OR BEST ESTIMATE _____ years

12. Did you do any actual installations of active solar energy systems in the years prior to CY 1980? (If you were only involved in completing hook-ups for systems which someone else installed, please answer "No" to this question.)

CHECK ONE

1 ☐ Yes → GO ON TO QUESTION 13

2 ☐ No → SKIP TO QUESTION 14

13. Please indicate in which states the active solar systems you installed at any time prior to CY 1980 were located, and indicate the number of such systems you installed in each of the states you check.

	NUMBER OF INSTALLATIONS PRIOR TO CY 1980		NUMBER OF INSTALLATIONS PRIOR TO CY 1980		NUMBER OF INSTALLATIONS PRIOR TO CY 1980
01 ☐	Alaska	18 ☐	Kentucky	36 ☐	Ohio
02 ☐	Alabama	19 ☐	Louisiana	37 ☐	Oklahoma
03 ☐	Arizona	20 ☐	Maine	38 ☐	Oregon
04 ☐	Arkansas	21 ☐	Maryland	39 ☐	Pennsylvania
05 ☐	California	22 ☐	Massachusetts	40 ☐	Puerto Rico
06 ☐	Colorado	23 ☐	Michigan	41 ☐	Rhode Island
07 ☐	Connecticut	24 ☐	Minnesota	42 ☐	South Carolina
08 ☐	Delaware	25 ☐	Mississippi	43 ☐	South Dakota
09 ☐	District of Columbia	26 ☐	Missouri	44 ☐	Tennessee
10 ☐	Florida	27 ☐	Montana	45 ☐	Texas
11 ☐	Georgia	28 ☐	Nebraska	46 ☐	Utah
12 ☐	Hawaii	29 ☐	Nevada	47 ☐	Vermont
13 ☐	Idaho	30 ☐	New Hampshire	48 ☐	Virgin Islands (U.S.)
14 ☐	Illinois	31 ☐	New Jersey	49 ☐	Virginia
15 ☐	Indiana	32 ☐	New Mexico	50 ☐	Washington
16 ☐	Iowa	33 ☐	New York	51 ☐	West Virginia
17 ☐	Kansas	34 ☐	North Carolina	52 ☐	Wisconsin
		35 ☐	North Dakota	53 ☐	Wyoming

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GO ON TO QUESTION 14

Survey Questionaire (continued)

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14. If your firm is **not** involved in the actual **installation** (placement) of active solar collectors, or if you do actual installation for only some of the active solar work your firm is involved in, please list below the names, addresses, and phone numbers for any solar installers that you or your customers use. These should be installers who are involved in or responsible for the actual **placement** of solar collector systems, rather than just completing hook-ups for such collector units.

We need this information to ensure that all solar dealers and installers are contacted to obtain complete and accurate data on active solar installations. Your name will not be used in any contacts with installers you identify, and the names you provide will be used for purposes of this survey only.

1. NAME OF FIRM: _____
   ADDRESS: _____
   CITY: _____ STATE: _____ ZIP: _____
   TELEPHONE: (_____) _____
   AREA CODE
   NAME AND TITLE OF PERSON WHO CAN BEST PROVIDE INSTALLATION INFORMATION: _____

2. NAME OF FIRM: _____
   ADDRESS: _____
   CITY: _____ STATE: _____ ZIP: _____
   TELEPHONE: (_____) _____
   AREA CODE
   NAME AND TITLE OF PERSON WHO CAN BEST PROVIDE INSTALLATION INFORMATION: _____

3. NAME OF FIRM: _____
   ADDRESS: _____
   CITY: _____ STATE: _____ ZIP: _____
   TELEPHONE: (_____) _____
   AREA CODE
   NAME AND TITLE OF PERSON WHO CAN BEST PROVIDE INSTALLATION INFORMATION: _____

4. NAME OF FIRM: _____
   ADDRESS: _____
   CITY: _____ STATE: _____ ZIP: _____
   TELEPHONE: (_____) _____
   AREA CODE
   NAME AND TITLE OF PERSON WHO CAN BEST PROVIDE INSTALLATION INFORMATION: _____

5. NAME OF FIRM: _____
   ADDRESS: _____
   CITY: _____ STATE: _____ ZIP: _____
   TELEPHONE: (_____) _____
   AREA CODE
   NAME AND TITLE OF PERSON WHO CAN BEST PROVIDE INSTALLATION INFORMATION: _____

(RECORD ADDITIONAL NAMES ON THE BACK OF THIS QUESTIONNAIRE, IF NECESSARY.)

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Survey Questionaire (continued)

IMPORTANT:

Finally, please provide the identification information requested below. This information will ONLY be used in case we need to contact you to clarify any information on your completed questionnaire. Information by which you or your firm can be individually identified will never be associated with any of your responses to this survey.

NAME OF FIRM: _____

ADDRESS: _____

CITY: _____ STATE: _____ ZIP: _____

TELEPHONE: (_____) _____
AREA CODE

YOUR NAME: _____

TITLE: _____

The sponsors of this important survey appreciate your willingness to participate. Your cooperation will benefit solar dealers, installers, and developers across the country and will aid in the planning and financing of solar energy activities in the future. Thank you!

PLEASE PLACE YOUR COMPLETED QUESTIONNAIRE IN THE POSTAGE-PAID ENVELOPE ADDRESSED TO OPINION RESEARCH CORPORATION AND MAIL IT TO US PROMPTLY.

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FEDEX

...a computerized index to energy statistical data from the Energy Information Administration

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For additional information, contact:

Energy Information Administration,
U.S. Department of Energy,
National Energy Information Center, EI-22,
Forrestal Building, 1F-048,
Code J-1
1000 Independence Avenue,
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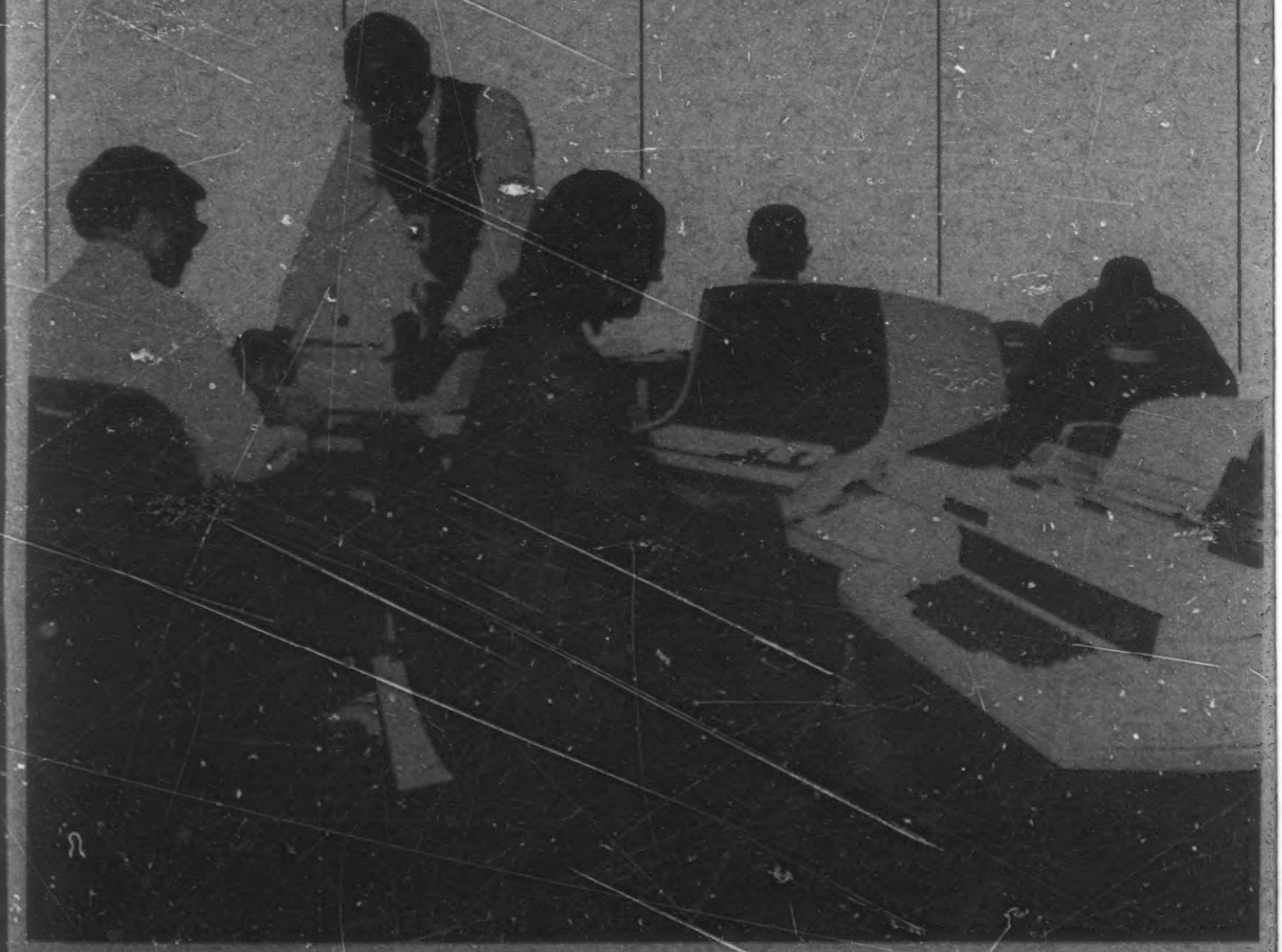

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